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SURGICAL AUDIT, PART I.

By JOHN SMYTH,

Royal Newcastle Hospital, Newcastle, N.S.W.

THE writings of Robert S. Myers are often accompanied by a statement that "this article has been read and approved by the Board of Regents of the American College of Surgeons". The article which he wrote in *Hospitals* of July 1, 1957, bore such an imprimatur. It began as follows:

> If the financial records of any hospital were audited as casually and as ineffectively as is the quality of its patient care, the Administrator and the Governing Board would probably land in gaol. Or barring such an unfortunate happening, the least they could hope for would be financial chaos, unpaid bills, and a richly deserved reputation for business incompetence.
>
> Actually there is much more reason to do a continuing and adequate medical audit in a hospital than there is to keep meticulous and informative financial records. The medical audit deals with the life and health of people: the financial audit is concerned only with money.
>
> Be that as it may, except for rare and isolated instances, an effective and adequate evaluation of the quality of patient care has been non-existent in the past.

Why, then, is medical audit so uncommon? Lack of it may be due to inability, lack of interest or antipathy. The 1956 report of the United States Commonwealth Fund points out that "The patient is the only reason for medicine". If his interest is dominant, and his proper care requires audit, lack of interest and antipathy have no place. Doctors sometimes think that medical auditing "digs up mud", engages in personalities and restricts their rights in patient care. Nothing could be further from the truth. As Myers and Slee have said: "Medical Auditing is properly directed towards evaluation of clinical practices rather than of clinical practitioners." And on the same topic, the handbook issued by the American College of Surgeons and the Commission on Professional and Hospital Activities (October 1, 1956) makes the following statement:

> The medical audit is the definitive tool of the medical staff in carrying out its most important function—maintenance of standards of practice. Contrary to common opinion, it is not a device for catching rascals. Its real purpose is to systematically review hospital medical practice through medical records in order to learn from the experience therein recorded.

In the particular instance of surgery, it is worth noting that operating without almost invariable fatality first became possible a little before the turn of the century. The exciting development of elaborate techniques engrossed the attention of many surgeons, who often overlooked the results, both proximate and distant, of such glamorous endeavours. When pressed, the surgeon sometimes replied

that "my impression is that this operation goes very well". This led to a surgical philosophy which could be described as "technique and impression". Almost, but not quite, the antithesis of this is the philosophy of "the search for perfection". This latter type of thinking looks at the gloomy side, prods consciences, digs into defects, counts undesirable features. In opposition to its counterpart of "technique and impression", the "search for perfection" is unspectacular, and, by its nature, even unpopular. For its implementation, auditing of surgical work is compulsory.

A little over two years ago, an attempt at surgical audit was begun at Royal Newcastle Hospital. For the last ten years the medical records of this hospital have been checked by doctors of specialist or registrar status before being filed. They were therefore adequate for the institution of an audit. This feature cannot be over-stressed. Audit demands good records, and in turn tends to improve them still further. It impresses on doctors' minds the necessity to enter findings, and has solved the problem of their forgetting to enter in the records such defects as infected wounds and post-operative pulmonary complications. One way to achieve apparently good results is to have members of the nursing staff enter such defects. This is the surest way to deceive oneself.

The medical records department collects the records of all general surgical patients discharged from hospital between the twenty-first day of one month and the twentieth day of the next; these are then audited on the last Friday of the month. The auditing of approximately 170 surgical records takes two people of specialist or registrar status about one and a half hours per month.

At first a rather elaborate audit form was introduced. As time went on, it became apparent that some undesirable features occur so rarely that counting of them has no significance (e.g., rupture of the abdomen). Other defects in surgical care have too much of the subjective about them, and the counting of them was also abandoned. For example, an attempt was made to count errors in surgical technique. This assessment cannot be made objective, and valid objections could be made to it. Post-operative deaths were also included; but the hospital's weekly "death meeting" is the proper audit of these, and the counting of them in the monthly surgical audit ceased.

Some of the features of the audit form require elaboration. In the case of diagnosis, correctness is assessed by comparing operation or tissue findings with the written pre-operative diagnosis of the most senior person to enter his opinion on the record. A differential diagnosis is entered as incorrect.

A hospital rule states that every portion of tissue excised in the operating theatre must be submitted to pathological examination. A normal finding is entered whenever the operation fails to find any abnormality on macroscopic examination, or when the tissue excised is stated by the pathologist to show no disease.

The criterion of an infected wound is the discharge of pus, no matter how little or how much, from a sutured wound.

Along with the audits from other departments, the general surgical audit is reported to the quarterly audit meeting of the medical board. Before this audit meeting, a copy of the surgical audit is sent to each member of the medical board for study. Included are the quarterly figures for the whole general surgical department and for each general surgical unit by name. Samples are shown in Figures I and II.

The results achieved are real. For example, the reduction over two years in post-operative pulmonary complications and in operations at which no abnormal tissue is found or excised is such that the χ^2 test of significance applied to figures of the first and last quarters gives $P < 0{\cdot}001$. In other words, such results could be expected to occur by chance less than once in 1000 trials. This reduction in both defects in surgical care is statistically highly significant.

For more details of the results achieved, the reader is referred to the second of these two papers, "Hazards of Operation".

SURGICAL AUDIT.

Month: January-March, 1958. Dr. Smyth.

		Correct	Incorrect
Diagnosis: Pre-operative		113	14 (11%)
No operation	83		
Proportion undergoing operation	60%		
		Pathological	Normal
Findings: Operation or tissue		124	3 (2%)
Post-operative complications:			
Wounds		Clean	Infected
Acute		41	13 (24%)
Elective		38	10 (21%)
Chests		2 (2%)	

FIGURE I.

A typical quarterly surgical audit report.

Summary.

Surgical audit is possible, easy and essential for proper surgical care. It is the handmaiden of the philosophy of "the search for perfection".

SURGICAL AUDIT.

Month: January-March, 1958. All surgeons.

		Correct	Incorrect
Diagnosis: Pre-operative		284	41 (13%)
No operation	192		
Proportion undergoing operation	63%		
		Pathological	Normal
Findings: Operation or tissue		316	13 (3%)
Post-operative complications:			
Wounds		Clean	Infected
Acute		85	37 (30%)
Elective		107	20 (16%)
Chests		7 (2%)	

FIGURE II.

A typical quarterly surgical audit report.

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SURGICAL AUDIT, PART II: HAZARDS OF OPERATION.

By JOHN SMYTH,

Royal Newcastle Hospital, Newcastle, N.S.W.

THE patient undergoing operation faces many perils, but no attempt will be made here to cover the whole of these fields. Discussion will be restricted to certain hazards which have been investigated in this hospital in recent years. Experience here has shown that counting and review of undesirable features are almost always followed by improvement. To be significant, counting requires that the phenomena counted be clearly defined. It is noticeable that counting tends to direct attention to the more common risks, as sufficient numbers are required to give significance to the results. These considerations have narrowed the field to the following hazards: (i) death; (ii) infected operation wounds; (iii) post-operative pulmonary complications; (iv) some hazards due to diffi-

culties implicit in the practice of surgery: (*a*) incorrect diagnosis, (*b*) uncertainty in operative indications, (*c*) operations in which no abnormality is found.

Death.

Even death, the greatest risk to the patient, requires definition. Sometimes it is counted only when it occurs on the operating table; in some series, when it occurs within one month or within two months of operation; in others, as opposed to discharge from hospital. In this hospital, patients are counted as discharged or dead. In connexion with mortality rates, it should be noted that it is easier to define an operation than to define a disease, and that a change of function is harder to define than a change of structure. Some mortality rates from the writer's unit are as shown in Table I.

TABLE I.

Procedure.	Patients.	Deaths.
Biliary tract surgery for stone (1951–1956) (Cass, Glass and Smyth, 1958)	180	2 (1·0%)
Partial gastrectomy for ulcer (1952–1957). .	66	1 (1·5%)
Intestinal obstructions and strangulations (1953–1957)	170	22 (13·0%)

Knowledge of these rates is of value, as rates in excess of those produced by other centres demand investigation. However, a bald statement of gross mortality rates is not enough. In the particular instance of death, it has been found that detailed review is superior to mere counting. An inquiry into each death is required, if its inevitability or otherwise is to be decided. This need is satisfied by a weekly clinico-pathological conference, a "death meeting". This has been in action since 1950 at the Royal Newcastle Hospital, under the control of the Director of Pathology. He reviews the deaths of the previous week, and chooses two for detailed discussion at the weekly meeting, which lasts one hour. Other deaths may be discussed at the weekly meeting, if anyone present so desires. The Director of Pathology reports the meeting's findings each quarter to the Medical Board.

For such a meeting, a high post-mortem examination rate is essential; the meeting also serves as a stimulus to obtain the maximum number of permissions for post-mortem examinations. From 1952 to 1957, there were 3285 deaths in this hospital. Of these, 322 were reported to the coroner. Of the remaining 2963 subjects, post-mortem examination was carried out on 2371 (80%). The meeting is not a "witch-hunt", as is feared by those not familiar with such procedures, but becomes a scientific forum which tends to highlight weak points in the care of the patients. The "sensitive areas" in surgical care include insufficient consultation, operative infections, post-operative pulmonary complications, wrong diagnoses, technical operative errors, misguided efforts at relieving or curing a patient by operation, and conservatism which delays or prevents operation when needed.

Infected Operation Wounds.

Not all operation infections are accompanied by infection on the surface, but infected wounds can be counted, and should reflect the general level of infection at operation. The words "infection at operation" were deliberately chosen as a large proportion of the infected wounds in the series healed, but pus later came to the surface from the depths, showing that infection in the ward was an unlikely explanation. It is our belief that nearly all infected wounds are infected in the operating theatre.

Objectivity in counting is essential if it can be achieved. After some counting and several changes, the standard of infection adopted was that pus should be coming from a wound which had been sutured. Some "red" wounds may thus be omitted, but observation has shown that most "red" wounds discharge pus a few days later. Even pus is subject to observer error, but in nearly all cases no real doubt exists.

It should be emphasized that most of the wound infections recorded were not of a serious nature, but the criteria adopted have been strictly followed, in conformity with the attitude that any laxity may allow the situation to become worse rather than better.

For example, a woman who had had a partial gastrectomy went home on the eighth day after operation with her wound apparently healed. She returned a week later with her wound healed, but stated that at home, on the eleventh day after operation, about 0·5 millilitre of pus escaped from the wound. Her wound was included in the infected group.

Infected wounds can be counted only if all the doctors concerned remember to record them when the stitches or clips are removed. Accuracy is impossible if the recording is left to the nursing staff. In any event, it could be that the counting of bad results is wrong. Perhaps it would be easier to count the wounds that heal by first intention, and to give no credit for any wound not specified on the patient's chart by a doctor.

The type of operation performed by the general surgical department of this hospital is influenced by the fact that the hospital has an accident service controlled by the orthopædic department. A 1957 count of 400 consecutive general surgical operations showed the distribution to be 84% abdominal, 8% limb, 6% head and neck and 2% breast.

Much has been made of the distinction between "clean" and "dirty" operations. Who, it is said, can prevent a wound infection when pus from a ruptured appendix flows over the wound? Surprisingly, 65% of these wounds heal by first intention. On the other hand, everyone admits that an elective herniorrhaphy wound should never be infected; 3% of our elective herniorrhaphy wounds are. A gall-bladder is "clean" if chronic cholecystitis is present, and "dirty" if it is acutely inflamed. Doubt occurs when it is subacutely inflamed. As it is open to subjective interpretation, the distinction between "clean" and "dirty" has therefore been dropped; in its place, wounds have been divided into "elective" and "acute".

To make the definition of "elective" and "acute" objective, those operations which are "signed-up" one day and performed the next day are elective; those "signed-up" and performed on the same day are acute. There is a hospital rule that all elective surgery must be "signed-up" by 2.30 p.m. on the day preceding operation.

Figure I shows the infection rate in "acute" wounds. The actual numbers of "first intention" and infected wounds are also shown. The rate is seen to be usually in the vicinity of 30%. The lack of improvement is apparent.

Figure II shows the actual numbers and rate of infection in "elective" wounds. The alarming rate of the first half of 1956 (39%) has been more than halved. During the period 1957-1958, the "elective" rate has been steady at about 15%. This is obviously much worse than the 2% to 3% of Howe (1957) from the Massachusetts Memorial Hospital, but his rate is that of "major" sepsis in "clean" operations. These two adjectives in quotation marks introduce a subjective element which the present method of counting has been designed to avoid. Even more important, Howe's method of counting excludes the major portion of the work of a general surgical department. For his restricted group, our figures are comparable (hernia, 3%); but to compute only the best figures must surely fail to represent any total situation.

The most serious results of infection at operation are morbidity and death. There is also serious economic loss. In a 1957 consecutive series of 400 acute and elective wounds which had been sutured, 79 discharged pus. These 79 patients were kept in hospital for an extra 967 days by their infected wounds. This averages 12 days, or at present bed costs, £60 per patient. It could be estimated therefore that the general surgical department's infected wounds cost £17,000 per year. For the whole 600 bed hospital, it

would not seem an exaggeration to estimate that infected wounds cost £50,000 per year in extra patient bed-days. It is not suggested that this expenditure can be eliminated; but the large sum involved is certainly worth effort to improve the situation.

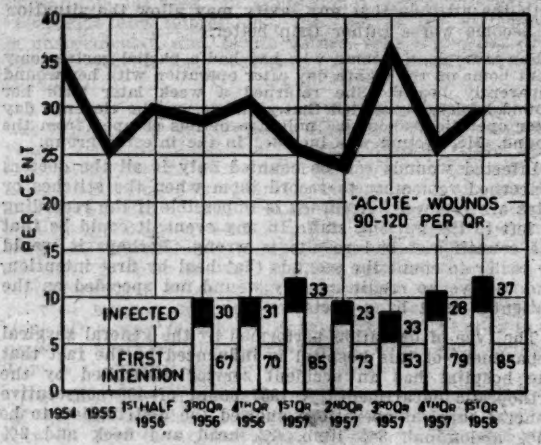

FIGURE I.

Infected wounds, "acute" general surgical operations, Royal Newcastle Hospital, 1954-1958, showing both percentages and actual numbers.

Better figures for elective operations performed in the orthopædic department raised the question that "no-touch" technique was the important factor. This suggested that infection rates would be higher if the gloves were punctured during operation. A series was counted, with the results shown in Table II. There is some difference,

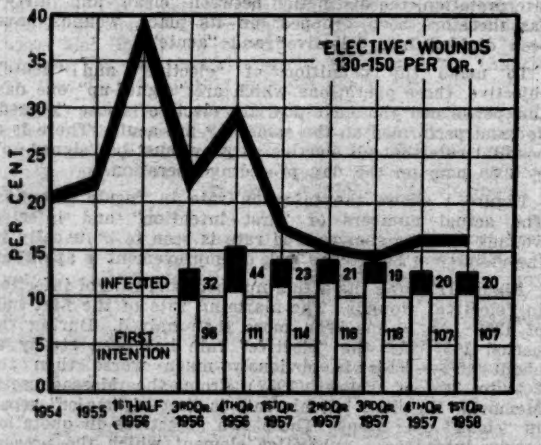

FIGURE II.

Infected wounds, "elective" general surgical operations, Royal Newcastle Hospital, 1954-1958, showing both percentages and actual numbers.

but it is not statistically significant. It may be that the better rate is due as much to the different nature and duration of the operations, as to "no-touch" technique. Also, "no-touch" technique is impossible in many abdominal procedures.

The next feature to be investigated was the duration of operation, as it was argued that the longer the wound was exposed, the greater should be the chance of infection. This was shown to be so; the infection rate rises steeply if the duration of the operation exceeds 90 minutes (Figure III).

The influence of contamination with gastro-intestinal contents was also studied, and the result is shown in Table III. It will be seen that a higher wound infection rate accompanies this phenomenon.

TABLE II.

The Incidence of Punctured Gloves and the Related Clean and Infected Wounds.[1]

Procedures.	Gloves.	Wounds.	
		Clean.	Infected.
Elective	Unpunctured.	51	16
	Punctured.	39	17
"Acute" ..	Unpunctured.	48	14
	Punctured.	26	11

[1] Proportion of operations in which there was at least one punctured glove, 98/222 (42%).

Table IV shows a consecutive series of operations divided into two groups. It would appear that the probability of infection also depends on the type of operation. It will be noted that Group II is heavily studded with those

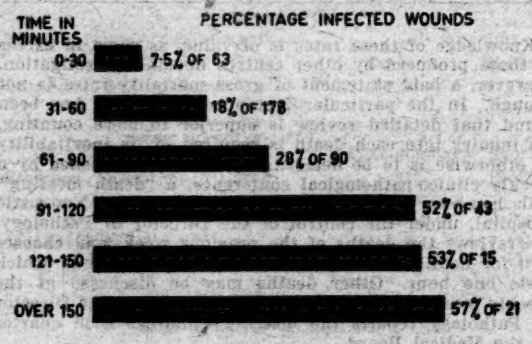

FIGURE III.

To show the relation between duration of operation and the percentage of infected wounds in a consecutive series of 400 "acute" and "elective" operations.

operations in which gastro-intestinal organismal contamination is the more likely.

Though there is no improvement in the "acute" figures, there is some improvement in the "elective" ones. Lack of

TABLE III.

The Number of Clean and Infected Wounds in Operations With or Without Contamination with Gastro-Intestinal Contents.

Contamination with Gastro-Intestinal Contents during Operation.	Wounds.		
	Clean.	Infected.	
Present	142	"Acute" procedures .. 55 Elective procedures .. 20	75
Absent	159	"Acute" procedures .. 8 Elective procedures .. 14	22

greater improvement has not been due to neglect of effort. The central sterilizing department has been placed under the control of a person trained in bacteriology, not in nursing. Unnecessary traffic into and in operating theatres has been stopped, meticulous scrubbing of hands has been insisted upon, proper ventilation of operating theatres has been assured. Bacterial counts of air, exposures of culture plates to theatre air over lengthy periods, culture from hands and from the insides of gloves at the end of

operations, have all been included. The attitude fostered has been that the most dangerous persons are the surgeon and his assistants, that they infect the wounds. Any improvement is probably due to the interest in the subject engendered by counting, in accordance with the frequently recurring phenomenon that counting is often followed by improvement.

TABLE IV.

A Series of Operations Divided into Two Groups to Show that the Wounds of Some Types of Operations are More Often Infected than are Those of Other Types.

Group I.			Group II.		
Procedure or Condition.	Wound.		Procedure or Condition.	Wound.	
	Clean.	Dirty.		Clean.	Dirty.
Inguinal hernia ..	35	1	Appendicectomy (including 2 elective) ..	99	37
Umbilical hernia ..	6	0	Closure of colostomy ..	0	4
Femoral hernia ..	4	0	Resection of colon ..	2	5
Incisional hernia ..	4	1	Resection of small bowel	2	3
Laceration of scalp and/or compound fracture of skull ..	8	1	Ruptured ulcer ..	10	4
Mastectomy and excision of breast lump	8	0	Biliary tract (elective)	16	4
Ramstedt procedure	3	0	Biliary tract (" acute ")	4	6
Peritoneoscopy ..	10	0	Partial gastrectomy	9	5
Thyroidectomy ..	3	0	Laparotomy (for obstruction, strangulation, peritonitis) ..	24	10
Hydrocele	8	1	Strangulated hernia	2	1
			Thigh amputation (for gangrene)	2	4
Total	89	4	Total	170	83

Post-Operative Pulmonary Complications.

Particular attention was paid to post-operative pulmonary complications, because these had been a major factor in post-operative deaths after upper abdominal surgery. For example, at a count made in 1957 of a series of biliary tract operations and partial gastrectomies in the writer's unit, in 230 operations there had been three deaths, all due to bronchopneumonia. Post-operative pulmonary complications, such as acute bronchitis, atelectasis, bronchopneumonia and lobar pneumonia, are diagnoses which are made on the clinical grounds of increase of sputum, temperature and respiratory rate *plus* the usual signs, with occasional help from the radiologist. This renders definition somewhat vague; but in practice, the complications are not so difficult to count, and it seems not unfair to state that the anæsthetic department, at first sceptical, now accepts the accuracy of the investigation conducted by the surgical department.

Figure IV shows the quarterly post-operative "chest" rate *per centum* from mid-1956 to the first quarter of 1958. Approximately 300 operations are performed per quarter. It will be observed that there is a recurrence of the now familiar phenomenon of improvement with counting, the mid-1956 rate of 15% having fallen to an average of 4% for the last year. The heavy line shows the rate of the whole general surgical department; the other lines indicate the rates of the various general surgical units taken separately. Although all units show improvement, the decreases in those which had the highest figures have been the most spectacular, showing that both surgeon and anæsthetist had a part to play in bettering the situation.

The Hazards to the Patient Resulting from Difficulties Inherent in the Practice of Surgery.

There are hazards to the patient resulting from (*a*) errors in diagnosis, (*b*) uncertainty, changing, or shifting of ground in operative indications and (*c*) operations in which no abnormality is found. These hazards fall into a rather more philosophical group than those previously discussed, and hence present more difficulties in assessment.

Errors in Diagnosis.

Correct diagnosis rates may be assessed if the diagnosis can be verified in an exact manner. Acute appendicitis lends itself admirably to this, if all the appendices removed are submitted to histological examination. If the hospital records are good, this verified diagnosis can then be checked against the pre-operative diagnosis, which must be written down (repeat, written down) before operation. Thus assessed, the accuracy of the pre-operative diagnosis of acute appendicitis at Royal Newcastle Hospital from July, 1953, to December, 1957, has varied from 68% to 82%, and has averaged 73%.

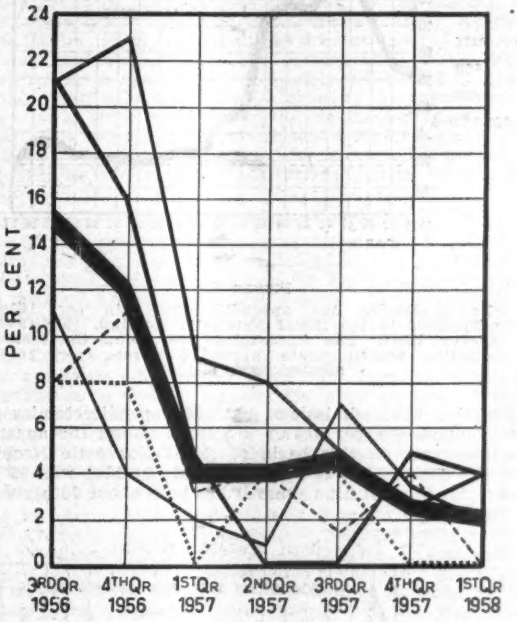

FIGURE IV.

The percentage of post-operative chest conditions, general surgical department, Royal Newcastle Hospital, 1956-1958. Heavy line: average of whole department (approximately 300 operations per quarter). Fine lines: individual units.

An investigation has been made of the accuracy of pre-operative diagnosis in the general surgical department from mid-1956 to the end of 1957: the pre-operative written diagnosis has been checked against the operation findings and/or the pathologist's report. The results are as shown in Table V.

TABLE V.

Period.	Correct.	Incorrect.	Percentage Incorrect.
Last quarter, 1956 ..	281	38	12
First quarter, 1957 ..	287	58	17
Second quarter, 1957 ..	275	40	13
Third quarter, 1957 ..	279	37	12
Fourth quarter, 1957 ..	290	32	10

The major proportion (75%) of errors is in acute rather than in elective cases, the diagnostic error rate in elective cases averaging 6%, and in acute cases (mostly abdominal) 25%. It seems hardly necessary to point out that the patient who is the subject of an incorrect diagnosis, and is operated upon accordingly, is subjected to an extra hazard.

Uncertainty in Operative Indications.

If an operation is necessary and useful, it would seem reasonable to expect that the indication for performing it would be well defined. This should make the operation rate uniform. But admission totals tend to change as hospitals vary in size, and it is suggested that the number of operations per year should be divided by the number of admissions in thousands per year, to give an operation rate per thousand admissions per year (e.g., 90 appendicectomies, 3000 admissions, rate 30 appendicectomies per 1000 admissions per year.) Figure V shows the appendicectomy rate on this basis at Royal Newcastle Hospital for the period 1938 to 1957. The rate in 1941 was 93 per year; for the last nine years it has been about 20 per year.

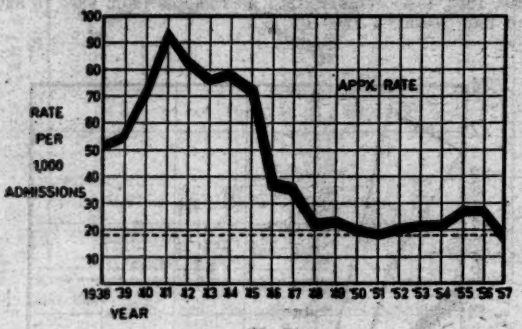

Figure V.

Graph showing the appendicectomy rate per 1000 admissions to the Royal Newcastle Hospital, 1938-1957 (heavy line). The interrupted line shows the histologically proven acute appendicitis rate per 1000 admissions, 1953-1957.

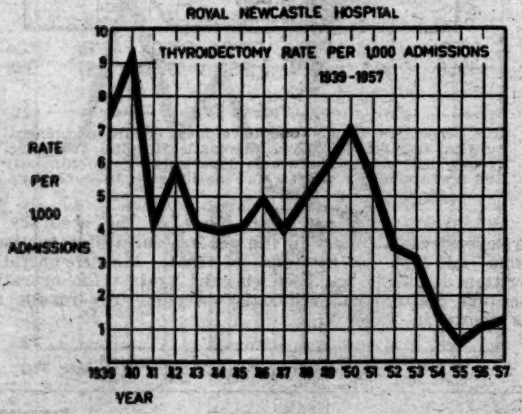

Figure VI.

Graph showing the thyroidectomy rate per 1000 admissions, Royal Newcastle Hospital, 1939-1957.

(These rates may be compared with the histologically proven acute appendicitis rate of 18 (range 14 to 22) per 1000 admissions from 1953 to 1957.) It seems difficult to imagine that this operation was required four and a half times as often in 1941 as in the period 1948-1957. Figure VI shows the thyroidectomy rate from 1939 to 1957. Again, it seems difficult to believe that this operation was required 19 times as often in 1940 as in 1956, or even seven times as often in 1950 as in 1956. Figure VII shows the biliary surgery rate from 1939 to 1955. Again, it strains credulity that this operation should have been necessary three times as often in 1950 as in 1954.

This method of calculation may seem indirect, but it is factual and objective, and can reveal these great discrepancies from year to year. The great fluctuations in these operation rates suggest uncertainty in the surgeons' minds with regard to the necessity for these operations.

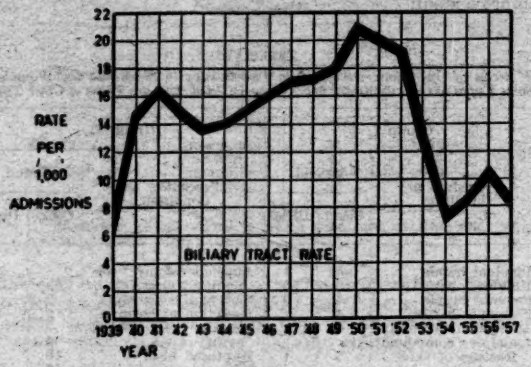

Figure VII.

Graph showing the biliary tract operation rate per 1000 admissions to Royal Newcastle Hospital, 1939-1957.

Operations at which No Abnormality is Found.

It is bad enough to undergo an operation, even worse to endure one in which no abnormality is found, and worst of all to die after such a useless procedure. But it may be very difficult to decide that a useless operation is also unnecessary. What is unnecessary in the opinion of one surgeon may be imperative in the opinion of another, as, particularly in abdominal surgery, diagnosis may not be exact enough to avoid exploratory operation. It is agreed that an operation may be useless, unnecessary and

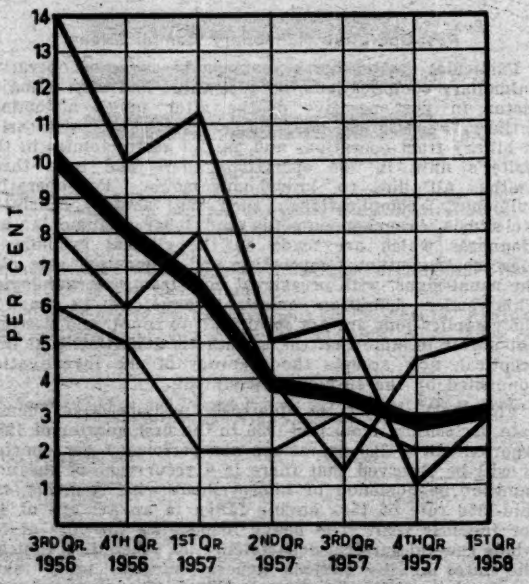

Figure VIII.

The percentage of operations in which no pathological condition is found, or in which the excised tissues show no pathological changes, general surgical department, Royal Newcastle Hospital, 1956-1958. The heavy line is the average figure of the whole department (approximately 300 operations per quarter). The finer lines show the rates of some individual units.

even harmful when some abnormality is found; but in order to exclude any subjective element, the counting has been restricted to operations at which no abnormality is found. It is obvious that this system of counting is weighted in favour of the surgeon.

In the calculation of this error rate, good operation records are mandatory. When no tissue is excised (for example, over-sewing of a ruptured ulcer), the surgeon's findings must be accepted. When tissue is excised, scientific assessment of it demands that all of it, every bit, be submitted to the independent and critical eye of the pathologist, a rule which has been strictly applied at Royal Newcastle Hospital for the last five years. A count has been made of the percentage of operations which uncovered only normal tissues, or at which tissue was excised and later declared normal by the pathologist, and the result is shown in Figure VIII. It must be emphasized that the surgeon was always given the benefit of any doubt. Over this period of 21 months, every quarter has shown a lower rate than the preceding quarter, and the 2·8% rate at the end of 1957 is about one-fourth of the mid-1956 rate of 10%. The count involves approximately 300 operations per quarter, and the improvement between the first and last quarters is statistically significant (Table VI).

TABLE VI.[1]

Period.	No Abnormality Found.	Abnormality Found.	Total.
Last quarter	9	313	322
First quarter	30	263	293

[1] $\chi^2=16·0$; $P<0·001$.

The rates of three individual surgical units are also shown. All have improved, those with the highest rates the most. This is perhaps the most striking result of our investigation, and the only conclusion that can be drawn is that patients underwent the hazards of useless procedures which were also unnecessary and avoidable.

Conclusion.

Diagnostic inaccuracy, superfluous, unnecessary, useless and even harmful operations, will never be eliminated. Infected wounds, post-operative chest complications and post-operative deaths will always present a challenge to the surgeon. Nevertheless, many of the hazards of operation, both technical and intellectual, can be counted, and improvement often follows counting and constant review.

Summary.

1. Certain hazards of operation have been discussed. When possible, a numerical analysis has been made.

2. Numerical analysis demands good hospital records.

3. When improvement is possible, it appears regularly to follow counting and review.

4. Mortality rates are useful, but have their limitations. For closer analysis and review of deaths, a regular "death meeting" is essential.

5. Infected wounds remain an unsolved problem, often minimized and understated.

6. Post-operative pulmonary complications are worth close attention by both surgeon and anæsthetist.

7. The extent of incorrect pre-operative diagnosis must cause some misgiving.

8. It should be possible to state fairly unequivocally the reason for an operation, and to adhere to that reason, if it is sound. This should mean that any operation will be required at a fairly constant rate, in proportion to the number of admissions.

9. Care should be exercised that uncertainty in diagnosis is not to be regarded as licence for unnecessary operation.

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BLOOD TRANSFUSION IN THE EARLY NINETEENTH CENTURY.[1]

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A NUMBER of good general accounts of the history of blood transfusion are available (Wiener, 1943; Keynes, 1949; Henry, 1954), and so, in the present paper, I propose to limit my discussion to the developments which took place within a specific period, namely, from 1818 to 1852. In this paper an account will be given of the experimental and clinical work which led to the reintroduction of blood transfusion into clinical medicine, and from the information obtained from contemporary reviews some of the advances in principles and practice made during that period will be outlined.

The Work of James Blundell.

Credit for the reintroduction of blood transfusion into clinical practice goes to an obstetrician and physiologist named James Blundell. Blundell, by his teaching, writing and practice, attained sufficient eminence in his profession to merit the publication of an account of his life in the "Dictionary of National Biography", and in Munk's "Roll of the College of Physicians". Yet neither of these publications mentions what surely must have been his greatest contribution to medical science, his work on blood transfusion. However, we need not waste too much sympathy on him for this omission, for in his lifetime he enjoyed the fruits of a highly successful career, and as a result of his midwifery practice was able on his death to leave an estate worth £350,000.

As an obstetrician, Blundell was constantly faced with those dramatic emergencies that are so familiar to everybody associated with the practice of obstetrics. In particular, the problem of obstetric hæmorrhage engaged his attention, and he saw clearly that the answer to that problem lay in finding some means of resuscitating patients who had suffered severe loss of blood. As a physiologist, he had the background necessary for the carrying out of the preliminary experimental researches needed to develop a practical technique of blood transfusion. He embarked, therefore, on a series of animal experiments with the object of developing a method of transfusing blood which could be applied in cases of obstetric hæmorrhage.

On February 3, 1818, a paper by Blundell was read before the Medico-Chirurgical Society by Mr. Henry Cline, the well-known surgeon (Blundell, 1818). In this paper Blundell stated that after one of his patients had died of uterine hæmorrhage he had realized that she might have been saved by a transfusion of blood. He had therefore undertaken a series of experiments on blood transfusion.

In his first experiment he bled a dog from the femoral artery until profound syncope developed and the circulation ceased. Blood from another dog was then injected into the femoral vein by means of a syringe. Recovery of the exsanguinated dog occurred. To make sure that blood did not undergo any alteration in the syringe, he withdrew and reinjected blood repeatedly over a period of 24 minutes. He also injected human blood into a dog and found that the animal revived initially but subsequently died. As he thought that delay in injecting the blood might have some effect on it, he repeated the experiment with the modification that the blood was reinjected immediately. In this case the dog survived. Then he bled three dogs and injected them with human blood without delay. All died.

[1] Read at a meeting of the Section of History of Medicine, with the Section of Medicine and Experimental Medicine, Australasian Medical Congress (B.M.A.), Tenth Session, Hobart, March 1 to 8, 1958.

However, he mentioned that a Mr. Goodridge had repeated this experiment and the dogs had survived.

He also referred to experiments made by a Mr. Leacock, who had injected sheep's blood into a number of exsanguinated dogs. In every case there was an initial recovery, but this was usually followed by death a few days later. As a result of Mr. Leacock's experiments, Blundell considered that it was not the delay in injecting the blood that killed the dog in his own experiment, but the fact that he had used blood from another species. He came to the conclusion, therefore, that one should always use blood for transfusion taken from an animal of the same species as the recipient.

In all the foregoing experiments arterial blood had been used. Blundell tried the experiment of injecting venous blood from one dog into another and found that it was just as satisfactory as arterial blood. He concluded from this experiment that the use of venous blood for transfusions in man would be reasonable and safe. Moreover, it would be easier to persuade people to give venous blood than it would be to persuade them to submit to the removal of blood from an artery.

He tested also the effects of injecting air into the veins of dogs with a syringe. Symptoms of restlessness, vomiting and muscular tremor developed, but the animals did not seem to be in any danger. From this experiment he was led to discount the danger of accidental air embolism when giving a transfusion by means of a syringe.

Finally, he made a number of experiments on the relative rates at which the blood coagulates in dogs and human beings. He found that human coagulation was slower, and therefore, as coagulation had not caused difficulty in transfusions in dogs, it should not do so in transfusions given to human patients.

As a result of these preliminary experiments Blundell laid down certain principles. He concluded that transfusion by means of a syringe was a safe and feasible procedure, air embolism was not a risk, the transfusion of blood after hæmorrhage could be life-saving, venous blood was just as satisfactory for transfusion as arterial, and only the blood from a donor of the same species as the recipient should be used. Having laid down these principles, Blundell had only to put them into practice on a human patient.

Later in 1818 Blundell performed a transfusion on an unfortunate gentleman named Brazier, who was suffering from "Scirrhosity of the Pylorus". In fact he was in a desperate plight. The case was reported in a paper which was read before the Medico-Chirurgical Society on December 22, 1818, and subsequently published in the *Transactions of the Medico-Chirurgical Society* (Blundell, 1819). In the giving of the transfusion the patient's cephalic vein was exposed and a longitudinal incision made in it with a lancet. A small amount of blood was taken from a volunteer and injected into the patient by means of a syringe. This procedure was repeated ten times until twelve to fourteen ounces had been injected over a period of thirty to forty minutes. No great change was observed in the patient at the time except that his colour improved. In the evening the patient's body was warmer and his respirations were regular. There was a reddening of the tip of the nose and the colour of the lips had improved. The patient felt stronger. However, on the third day after the operation he relapsed and died.

At autopsy the diagnosis of scirrhus of the pylorus was proven. However, in this case the question of the pathological diagnosis was of secondary interest to the question of whether any complications had resulted from the transfusion, and so particular attention was paid to the state of the vein through which the transfusion had been given. The only unusual appearance found was a dark red discoloration of the intima extending half an inch above and one or two inches below the incision. There was no swelling of the coats of the vessel, no exudate and no evidence of spreading inflammation.

In commenting on this case, Blundell said that in view of the extreme inanition of the patient the amount of blood given was probably quite inadequate. He thought that the deficiency of blood would have been equivalent to at least one and a half gallons and probably to as much as two and a half gallons. In speculating whether life would have been prolonged by a larger transfusion, he realized that the infusion of larger volumes of fluid would have brought its own dangers. In view of the feebleness of the heart and vessels, the transfusion of even two or three pints probably would have been unwise. In other words, the case was hopeless. On the other hand, although the outcome of this case had been fatal, he saw cause for optimism about the future of blood transfusion. The procedure itself was quite easy to perform and the immediate effects on the patient had been beneficial. He recommended that further observations and experiments be made and that blood transfusion be tried on other patients.

Credit must go to Blundell for pioneering the giving of transfusions to patients with blood from human donors. Not only was he, as far as we can judge, the first in the field, but also, as mentioned above, his preliminary experimental work laid down a number of sound principles to be followed in performing the operation, and from the clinical experience of Brazier's case he reached certain conclusions on the quantitative aspects of blood transfusion. In the years that followed Blundell and others performed a number of transfusions and were encouraged by occasional successes. Blundell also designed a number of instruments for performing blood transfusion, but time does not permit a discussion of them.

Routh's Series.

By 1849 C. H. Routh, physician to St. Pancras Royal General Dispensary, was able to list 48 cases of patients treated by blood transfusion which had been reported up to that time (Routh, 1849). Among the 48 patients were three in whom transfusion had been performed by Denys, and one in whom it had been performed by Lower and King in the seventeenth century. From a study of his series, Routh concluded that blood transfusion was one of the safest operations then practised. Among the 48 patients, 18 deaths had occurred. Although this does not accord with our ideas of a safe operation, it must be remembered that surgery was a hazardous business in those days, and Routh was able to back up his assertion as to the safety of blood transfusion by giving a table showing the comparative mortality rates of various operations. This showed that the results of blood transfusion compared quite favourably with those of other surgical procedures.

Routh also referred to an earlier series of 35 cases collected by Mr. Peet of University College Hospital. Unfortunately Peet's original paper had been lost, but there was an abstract of it in *The Lancet* (1841-42). There is, of course, considerable overlap between Routh's series and Peet's, as many of the same cases were included in each. In Peet's series 13 patients had died, but only three of these deaths could be attributed to the transfusion. Furthermore, when the seventeenth century cases were excluded from the series, only two deaths out of the 30 patients could possibly have been attributed to the transfusions. This same comment would, of course, apply to Routh's own series.

Routh drew a number of conclusions from his review of patients treated by blood transfusion. The most favourable results seemed to be obtained in cases of uterine hæmorrhage. He thought that an adequate quantity of blood should be transfused, and that the amount given should be not less than seven ounces. The greatest number of successful cases occurred among those who had received from 12 to 16 ounces. Many patients in the series had received merely token transfusions of amounts as small as two ounces. For administering the blood Routh favoured an instrument such as Blundell's "impellor". Out of four patients with cholera who were treated by transfusion three died, but the amounts administered to them were insufficient to have had any beneficial effect.

Throughout his paper Routh revealed an analytical and critical mind, both in his analysis of the mortality figures and in his comments on individual cases. For example, in one case of phthisis, which seemed to have a most unfavourable outlook, a transfusion had been given and the patient had survived. However, Routh realized that the cure was due not to the blood but to the healing powers of Nature. Although hæmolytic transfusion reactions had been seen in

the transfusions from animals to men carried out in the seventeenth century, Routh's series contained no references to these or other complications. It seemed worthwhile, therefore, to follow up the original reports of the fatal cases to confirm the absence of such reactions. None was found, but a number of interesting facts came to light. For example, one of the fatal cases was that of a patient with hydrophobia whom Dr. Dieffenbach (1828-29) attempted to cure by transfusion, or more correctly by exchange transfusion, for before each injection of blood a considerable quantity was first withdrawn. This must surely be one of the first attempts at exchange transfusion, although, of course, no attempt was made at complete replacement. Dieffenbach also attempted to revive the asphyxiated fœtus of a mother who had died in childbirth by transfusion of two ounces of blood into the umbilical vein. Although this procedure had no effect, this was, as far as I can find, the first attempt to give a transfusion by this route. Dieffenbach made a number of experiments on blood transfusion in animals of different species. Attempts were made also to give a transfusion through the external jugular vein.

Soden's Series.

A further review of patients treated by blood transfusion was given by John Soden, F.R.C.S., surgeon to the Bath General Hospital (1852). Soden described the case of a patient with hæmorrhage from inversion of the uterus, whom he had treated successfully by blood transfusion. He thought that, as well as reporting this case, it might be useful to review all cases in which blood transfusions had been given up to that time, and thus to try to lay down useful principles for practitioners contemplating this procedure. However, he found that, except in cases of uterine hæmorrhage, the number of patients treated by blood transfusion had been too small to allow of useful deductions being made from them. Furthermore, he found that Routh's series had been so complete and well done that a general review of blood transfusion was not worthwhile. For these two reasons he confined his own series to cases of uterine hæmorrhage. Of these, he found that 36 patients had been treated by blood transfusion. In this series seven cases had been fatal. Soden's remarks about these fatal cases are of interest. In two cases respiration had ceased before the operation and the injection of 12 ounces of blood had produced no effect. An insufficient quantity of blood had been given to another patient. No effect was produced in one case. In another patient animation was restored after the administration of seven ounces of blood, but relapse occurred in one hour. A second injection revived the patient, but to a lesser extent than the first, and she died one hour later. Yet another patient was at her last gasp when the transfusion was attempted. The procedure did not seem to have any noticeable effect, except to cause the patient to mutter indistinctly. The circulation did not improve after 10 ounces of blood and she died immediately after the operation. Ten ounces of the husband's blood were given to another patient when she was pallid, exhausted and cold, and had a pulse beat that was just perceptible. During the injection she became more distressed, her pupils dilated, her face became cyanosed and her pulse became imperceptible. Death occurred within one hour. Soden thought that the last two patients were too far gone to be restored, and that in all of the seven fatal cases death had been inevitable.'

Commenting on his series, Soden thought that the effects of transfusion were not due simply to a restoration of a deficiency. Probably it was a stimulus to exhausted energy too. The rapidity of revival varied with circumstances, the most important being the quantity and quality of the blood. He thought that if the collapse resulted from sudden shock rather than from hæmorrhage a smaller amount of blood was needed. The most difficult patients to revive were those suffering from placenta prævia who had had considerable hæmorrhage prior to labour. As regards the quality of the blood, he thought that blood drawn from different individuals could have an equally good effect. In passing he mentioned that Dr. Simpson had used saline in uterine hæmorrhage. It had been a complete failure in this condition, in contrast to its partial success in cholera. He thought that the danger of air embolism was slight. The only complications he mentioned in those patients who survived were a slight oppression in breathing in one patient and phlebitis, confined to the forearm below the incision, in two patients.

Discussion.

As we have seen in the period under review, the pioneers of blood transfusion laid down certain fundamental principles for the performance of the procedure. They proved its feasibility. They demonstrated the importance of transfusing blood only from donors of the same species as the recipient, and they realized the importance of giving adequate quantities of blood, although their conception of what constitutes an adequate quantity differed from ours. The technique they favoured for the administration of blood was to inject it through a syringe or through special instruments invented by Blundell. But in addition, during this period, an attempt was made to give an infant a transfusion by the umbilical vein, an attempt was made to perform an exchange transfusion, and an attempt was made to administer blood by the external jugular vein.

One gets the impression, from the reviews cited, that the reviewers were most optimistic about the future of blood transfusion. It would be easy to suggest that they would not have been nearly so optimistic if surgical procedures generally had not carried such a heavy mortality at that time, so that blood transfusion seemed to be by comparison a safe procedure, the complications of which tended to be disregarded. However, this cannot be the whole story, for if we examine Routh's and Soden's series we find that the deaths were due mostly to failure of the transfusion to produce the desired effect rather than to any mishaps caused by it. One is impressed by the absence of any reference to fatalities from hæmolytic reactions in patients given a transfusion of blood from human donors in the early nineteenth century.

This freedom from complications was probably due to the fact that in small series, like those discussed, the actual numbers of patients who received blood which was not of either group O or the patient's own group must have been very small. Furthermore, as most of the transfusions consisted of very small quantities of blood, the chances of fatal hæmolytic reactions occurring in the series were diminished still further. What is more surprising is the absence of reports of pyrogenic or septic complications. Soden, for example, found only two cases of phlebitis in his series and neither author mentioned generalized febrile reactions or other severe pyrogenic or septic complications. The fact that Soden reported the cases in which phlebitis did occur suggests that he, at least, was on the lookout for this complication and did not merely accept sepsis as inevitable. Neither author mentioned clotting of the blood as causing difficulty during the procedure. Although it was not mentioned in any of the papers under review, it was during this period that Bischoff in 1835 experimented with the use of defibrinated blood, and Larsen in 1847 applied it to actual transfusion.

Later in the century the optimism of workers like Routh and Soden was to give way to a more guarded attitude. As experience accumulated the difficulties and dangers of transfusion became more apparent and more and more accidents were reported. Furthermore, some enthusiasts used transfusion in most unsuitable cases by most bizarre methods. Even the use of animal blood for human transfusions was revived. As a result, towards the close of the century the procedure fell largely into disrepute, until with the dawn of the twentieth century and the work of Landsteiner the way was opened to safe and effective blood transfusion and the modern period was born.

Summary.

Some of the developments which took place in blood transfusion during the period from 1818 to 1852 are reviewed. The experimental and clinical investigations made by James Blundell are described and the principles he laid down are discussed. He showed that transfusion was a safe and feasible procedure that could be lifesaving, air embolism was not a great risk, venous blood was satisfactory for transfusion, and only blood from a donor of the same species as the recipient should be used. Reviews of the reported cases treated by blood transfusion up to that time were made in the middle of the nineteenth century by

C. H. Routh and by J. Soden, who were most optimistic about the benefits of blood transfusion and about its future place in medical practice. The patients who died in their two series did so in spite of transfusion and not as a result of complications such as hæmolytic reactions. It is suggested that the reason for this absence of fatal hæmolytic reactions was that the chances of their occurring were low because of the small number of patients involved and were made even slighter by the small quantities of blood transfused. As experience accumulated, more and more complications were reported and the early enthusiasm was not maintained in the medical profession until the discoveries of Landsteiner, in the beginning of the present century, allowed blood transfusion to take its proper place in medical practice.

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ALCOHOL AS A FACTOR IN MEDICO-LEGAL SUDDEN DEATHS.[1]

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IN 1949, Bowden and McCallum pointed out that, while it is illegal to take without consent blood from a live person for the purposes of alcohol estimation, there is no fear of a charge of assault when the blood is taken from the dead body at an autopsy, and that if investigations of this kind are not carried out, valuable evidence may be lost in medico-legal cases. As a result of their experiments, these authors drew the following conclusions: (i) There are satisfactory methods for estimating the post-mortem blood alcohol levels, and that these levels are of great value. (ii) The results are reliable if the blood is taken from a peripheral source, but are open to errors if it is taken from the heart, the chest, or the abdominal cavities. Heart blood was found to be reliable only if taken almost immediately after death.

The importance of these conclusions was quickly realized, and testing is a routine procedure in most centres where facilities exist for blood alcohol estimations.

In 1957, A. T. Pearson gave a summary of his experiences over a period of seven years in Perth. In this series, 218 tests were performed in fatal traffic accidents, and in 92 cases alcohol was present in the blood (42%). Four out of every 10 people killed had a blood alcohol content of 100 milligrammes per 100 millilitres or over—a potentially dangerous level. As Pearson states, this is an appalling state of affairs. His figures are, however, open to one criticism, in that the blood for the test was taken from the heart, and that though this is reliable at the time of death, as Bowden has shown, alcohol in the stomach will diffuse and give an erroneously high reading later on.

In Hobart we have for a long time realized the value of blood alcohol tests in connexion with coroner's work, but, until fairly recently, we had no facilities for performing the estimations. At the present time, the Government Analyst's Department is performing the tests, using the methods of Cavett (1937-1938) and of Kozelka and Hine (1941), slightly modified and recommended by a panel of analysts appointed by the Royal Institute of Chemistry to assist the Committee of the British Medical Association on Alcohol and Road Accidents (Kent Jones and Taylor, 1954).

Material for Testing.

Whenever possible, blood is withdrawn by cutting through a femoral vein, and there is usually little difficulty in obtaining several millilitres. Occasionally, in subjects with great blood loss; the femoral vessels are empty, and it is necessary to depend on the cerebral vessels after removal of the brain, or on heart blood. It is our practice to collect urine also, if the femoral vein site is unsatisfactory, or if there are unusual circumstances about the death.

The blood or urine is delivered immediately to the analyst, who adds fluoride as a preservative if the test is not made until later. No cleansing of the skin of the thigh is used, but care is taken to see that bottles and corks are free from reducing substances.

Nature of Report.

The analyst reports the alcohol content of the blood in milligrammes per 100 millilitres of blood, works out the total amount of absolute alcohol present in the body (assuming the deceased's weight to be 11 stone), and then gives the amount of whisky and beer which is equivalent to the calculated amount of alcohol present. A typical report would read something like this:

> The blood specimen contained 325 milligrams of alcohol per 100 millilitres.
>
> For an 11 stone man, this concentration is equivalent to, and for any other body weight is proportional to, a minimum quantity of 172 millilitres of absolute alcohol present in the body tissues at the time of death.
>
> This quantity of absolute alcohol is contained in 15 fluid ounces (nips) of whisky or other spirits (40% alcohol by volume), or in 20 beers (reputed 7 oz. glasses), and is the minimum amount consumed. The urine contained 429 mgm%, which concentration is consistent with that found in the blood.

It is important to realize that the figure given is the minimum amount consumed. Putting the calculation in terms of well-known drinks enables all persons in court to understand the significance of the figures better.

Suitable Cases for Testing.

To prevent undue loading of the Analyst's Department, the test is not used in all deaths, and at present is confined to murder, manslaughter and some traffic accidents, and to cases in which alcohol is suspected as a causative factor in the death.

Results.

The findings in a consecutive series of fatal traffic accidents over a period of three and a half years are given in Table I. This table includes train accidents, but not aircraft or tractor accidents. Although the figures are of value in all traffic cases, they are of most use when the driver of a vehicle or a pedestrian is involved.

Illustrative Cases.

An elderly man and his wife were killed when their motor-car crashed into the back of a motor-lorry parked on the side of a country road. No alcohol was found in the driver's blood. This negative finding agreed with other evidence, which suggested negligence on the part of the truck driver, who failed to have a light showing on the rear of his truck.

An old model motor-car ran off the road into a creek, all the occupants being drowned. The driver's blood alcohol content was 30 milligrammes per 100 millilitres. When the car was recovered it was found that a vital part of the steering mechanism had broken.

The driver of a motor-car crashed head-on into the back of another car. The cause of the accident was obscure until the blood alcohol figure of 232 milligrammes per 100 millilitres became available.

A man fell out of the door of a moving motor-car on to his head, and was killed instantly. His blood alcohol content was 163 milligrammes per 100 millilitres.

[1] Read at a meeting of the Section of Pathology, Bacteriology, Biochemistry and Forensic Medicine, Australasian Medical Congress (B.M.A.), Tenth Session, Hobart, March 1 to 7, 1958.

TABLE I.

Victims.	Number of Fatalities.	Victims Not Tested.	Victims Tested.	Alcohol Found. (Milligrammes per 100 Millilitres.)			
				Nil.	10 to 100.	101 to 200.	Over 200.
Motor-vehicle drivers	21	12	9	3	1	5	—
Motor-vehicle passengers	24	16	8	1	3	3	1
Motor-cycle drivers	12	8	4	1	1	1	1
Pillion passengers	5	4	1	—	1	—	—
Push-cycle riders	1	1	—	—	—	—	—
Pedestrians	42	28	14	0	3	4	7

The rider was found dead beside his crashed motor-cycle. His blood alcohol content was 308 milligrammes per 100 millilitres—equal to a minimum consumption of 14 whiskies.

A single-seater motor-car ran into a motor-lorry; a man sitting on the extreme left of the driver was killed. As the dead man's blood alcohol level was 224 milligrammes per *100 millilitres, and as he had been drinking steadily with* the driver of the car that night, it could be reasonably inferred that the driver, too, was well under the influence *of alcohol at the time of the accident.*

The driver of a motor-car stated that he came over a rise and saw a man lying on the road in such a position that *he was unable to miss him. The driver's story was cor-*roborated by a blood alcohol finding of 345 milligrammes per 100 millilitres in the pedestrian—a figure in the coma *range.*

A motor-cyclist collided with a motor-car. The alcohol content as measured in the blood from the chest cavity was *83 milligrammes per 100 millilitres, but that from the femoral* vein contained only 26 milligrammes per 100 millilitres; this removed him from the suspicious to the non-suspicious range.

Uses in Other Cases.

Blood alcohol estimations have been found of great value in many cases in which the actual cause of death was not clearly indicated at post-mortem examination.

An army cook had been drinking heavily with some friends, was heard vomiting, and later became silent. His friends, thinking that he had "blacked out", left him propped against a fence near his barracks. He was still there next morning. His blood alcohol level was 395 milligrammes per 100 millilitres, and it is probable that he was already dead when his friends left him.

A man was found lying on the ground with vomited material in his wind passages. The blood alcohol level was 338 milligrammes per 100 millilitres. He had died as the result of insufflation asphyxia.

Another good example of the danger of asphyxia when the cough reflex fails to guard us is seen in the case of a man who was found one night in a drunken state by the police. The man did not speak to them, but as he was known they took him home and made him comfortable against the wall of his front veranda. About two hours later the relatives returned home to find him dead. At autopsy a piece of steak measuring two inches by two inches by half an inch was found wedged in the back of his throat. His blood alcohol level was 293 milligrammes per 100 millilitres.

A man was seen to fall from a jetty into the sea. Though rescued quickly and given artificial respiration, he failed to recover. His blood alcohol level was 299 milligrammes per 100 millilitres.

One frosty night a man fell off the steps of an hotel fire escape and fractured his skull. A blood alcohol level of 290 milligrammes per 100 millilitres helped explain the fall.

Urine Alcohol Estimations.

Generally, the urine alcohol level was approximately one-third greater than that in the blood; this indicated a position of stability. When a lower figure was obtained, it could indicate recent drinking, and when the figure was much higher, it suggests that some appreciable time had elapsed since drinking ceased. Sometimes this difference can be of considerable value.

A man was found alive at the base of a quarry, having apparently fallen down the face some hours before. He was unconscious and died soon after. His blood alcohol level was only 44 milligrammes per 100 millilitres, but the urine alcohol content was 216 milligrammes per 100 millilitres, suggesting that at the time of the fall he was intoxicated.

Conclusion.

The results of blood alcohol estimations on deceased persons who are to be the subject of a coronial inquiry *are of great value, especially in traffic accidents, when* persons are suspected of having been under the influence of alcohol at the time of death. If the test is omitted, then a valuable piece of evidence becomes unavailable to the coroner and to other persons directly concerned in the death.

Summary.

1. The results of blood alcohol estimations carried out on fatal traffic accident victims and other deceased persons are presented.

2. The methods used for collection of the blood and for calculation of alcohol content are given.

3. The great value of the findings, even if negative, is stressed.

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AN OUTBREAK OF DENGUE-LIKE FEVER, NORTH QUEENSLAND, 1954: SEROLOGICAL FINDINGS WITH THE VIRUS NEUTRALIZATION AND COMPLEMENT FIXATION TESTS.

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AN epidemic of dengue-like fever occurred in Townsville, North Queensland, during the period February to May, 1954 (Rowan, 1956). Dengue fever has been recognized clinically in Queensland for many years, and serological evidence of the presence of Murray Valley encephalitis around Townsville has been described by Anderson (1954). These studies were instituted in an endeavour to ascertain the cause of the outbreak.

The original attempts at virus isolation failed, partly because of the appearance of a virus allied to the G.D.VII strain of murine encephalitis in the mice used for passage

of the material, and partly, it is probable, as will be described later, because the strain of mice available appears to possess a low sensitivity to the dengue group of viruses. Circumstances have, to date, prevented a reinitiation of the attempt to isolate the virus.

Even though the causative virus was not recovered, it is thought desirable that the serological findings be reported, as they suggest that the complicated picture with regard to the arthropod-borne group of viruses described by various authors for other tropical areas may also exist to some extent in North Queensland (Smithburn *et alii*, 1954; Pond *et alii*, 1954).

With the use of the viruses of dengue type I and dengue type II fever, Murray Valley encephalitis, Japanese encephalitis and West Nile fever, sera collected during the epidemic were examined by the techniques of complement fixation and virus neutralisation. In addition to sera collected by the writer, further specimens were kindly made available by Dr. E. H. Derrick, Deputy Director, Queensland Institute of Medical Research, and by Dr. W. R. Horsfall and Dr. R. Rimington of the Commonwealth Health Laboratories of Cairns and Townsville respectively.

Materials and Methods.

Serum.

Except for acute phase sera intended for virus isolation, which were kept on dry ice from the time of collection, other sera were kept at 4° C. until arrival at the laboratory, after which they were stored at −20° C. Some sera which had been held at 4° C. for three months were found to have lost their complement fixing antibodies, which had previously been present. Sera were inactivated at 56° C. for 30 minutes prior to use. Whitman (1947) described the presence in serum of a heat-labile factor, which enhanced neutralization by the St. Louis encephalitis virus. Sabin (1950) has drawn attention to the existence of a similar factor in neutralization tests with the dengue viruses, so that the results recorded here may be somewhat low. This factor may assume some importance in the performance of tests when only small amounts of neutralising antibody are present, as occurred in three instances among the sera under consideration, with the Murray Valley and West Nile viruses.

Viruses.

Murray Valley encephalitis virus was received through the courtesy of Sir Macfarlane Burnet, Director of the Walter and Eliza Hall Institute, Melbourne, and was used in the eleventh to fourteenth mouse passage. Dengue type I virus was obtained by the late Dr. J. L. O'Connor from Dr. A. B. Sabin, Children's Hospital, Cincinnati, U.S.A. It was used in the one hundred and twenty-sixth to one hundred and twenty-eighth mouse passage. The dengue type II virus was provided from the same source, and used in the eleventh to fourteenth mouse passage. West Nile fever virus (Egypt 101) was kindly supplied by Dr. M. Theiler of the Rockefeller Foundation, New York, U.S.A., and used at the thirtieth to thirty-second mouse passage level. Japanese encephalitis (Nakayama) was obtained through the favour of Colonel J. B. Smadel of the United States Army Medical Research and Graduate School, Washington, D.C., U.S.A., and used in the forty-fifth to forty-sixth mouse passage. The viruses were stored as lyophilized or wet 10% suspensions of infected mouse brain in 10% normal inactivated rabbit serum in 0·85% saline at −70° C. and passaged intracerebrally in suckling white mice as required. In the absence of standard type specific antisera, the purity and identity of the strains were assumed from the practice followed of not passing two viruses concurrently in the laboratory and from observation of their behaviour on passage in mice and in the neutralization tests.

Technique of the Serum Neutralization Test.

The serum neutralization test was carried out as follows:

Two ampoules of lyophilized virus or frozen virus were rehydrated or thawed 20 minutes before use, and dilutions of 1:5, 1:50, 1:500 etc. were made with heat-inactivated 10% normal rabbit serum in 0·85% sodium chloride. Equal parts of the virus dilution and undiluted serum were mixed, shaken and placed in a water bath at 37°C. for two hours, except in the case of the dengue viruses, where the time was reduced to one hour, because longer incubation seriously reduced the titre of these viruses. For the virus control titration, inactivated normal rabbit serum was used to add to the virus dilution. Four-weeks-old white mice in groups of six were inoculated intracerebrally with 0·03 millilitre of the serum-virus mixture. All sera were tested as a group with one virus at a time on separate days, and inoculations were completed within three hours of addition of the virus to the serum. One person performed all the neutralization tests. The mice were observed daily for paralysis or death for 21 days, except in the case of those inoculated with the dengue II virus, in which the period of observation was extended to 28 days because of the lateness of onset of symptoms. Deaths before the fourth day were disregarded. From the L.D.50 as calculated by the method of Reed and Muench (1938), in the mice inoculated with the test serum-virus mixture and in mice inoculated with the control serum-virus mixture, the neutralization index was calculated.

Technique of the Complement Fixation Test.

Antigens were originally prepared from the brains of infected suckling mice according to the method of Sabin (1948). Later, the acetone-ether extraction procedure of Casals (1949) was adopted.

A quantity of 0·1 millilitre of antigen was added to 0·1 millilitre of inactivated serum serially diluted 1:10, 1:20, 1:40, etc., and 0·2 millilitre of guinea-pig serum diluted to contain two exact units of complement. Appropriate controls of the antigen, of the serum under test, and of the "positive" and "negative" control sera for anticomplementary activity, and a titration of the complement in parallel with the test were performed. After fixation at 4°C. overnight, 0·2 millilitre of sensitized sheep erythrocytes was added, and incubation was carried out for 30 minutes at 37°C. The suspension of erythrocytes was prepared by adding to amboceptor, diluted to contain three units of haemolytic activity in 0·2 millilitre, equal parts of a 3% suspension of cells which had been thrice washed in saline. Four or three *plus* fixation was taken as a positive result, and the titre expressed as the reciprocal of the dilution. The diluent was 0·85% sodium chloride solution. The antigen was titrated by the grid method, and an endeavour was made to use four units of antigen in the test.

Whereas the Murray Valley, Japanese encephalitis and West Nile viruses rarely gave a titre of less than log 7 L.D.50 after intracerebral inoculation in mice, the two dengue viruses frequently were below log 5·5 L.D.50, and for reasons of expediency the antigens had often to be used at a strength of two units. This is contrary to the experience of Sweet and Sabin (1954), who achieved titres of log 7 L.D.50 with both types of dengue virus in the strains of mice which they used. It would appear that the strain of mice available in this laboratory is not a sensitive soil for the propagation of the dengue viruses. Sabin (1952*a*) has commented on this point, and in a list of 15 viruses used by Smithburn *et alii* (1954) the two dengue viruses are noted as having the lowest mean titre in the protection challenge doses.

Results.

Neutralization Tests.

Using as challenge the dengue I, dengue II, Murray Valley encephalitis, Japanese encephalitis and West Nile fever viruses, neutralization tests were performed on 12 sera, the results of which are set out in Table I. All sera show little or no neutralising antibody to the last three viruses. Eight show high indices to the dengue I and significant figures for the dengue II virus, but well below those to the first virus. One taken 18 months after the attack still shows more antibody for the dengue I than for the other viruses. Three sera possessed high titres to the dengue II as well as to the dengue I virus. The precautions taken in the passage of the viruses and in the performance of the neutralization test exclude as far as possible a confusion of the viruses, and the possible significance of these results will be treated in the discussion. One serum (Martin) possessed a neutralization index of 100 against the Murray Valley virus, and 127 against the West Nile virus, and two others, Perkins and

TABLE I.

Neutralization Tests with Convalescent Sera Against Five Different Viruses.

Serum.	Days from Onset.	Neutralization Indices.				
		Dengue I.	Dengue II.	Murray Valley Encephalitis.	Japanese Encephalitis.	West Nile Fever.
Martin	18	17,780	16,260	100	<126	127
Fowler	51	22,390	26,120	<50	<126	<155
Sterling	47	23,990	16,260	<50	<126	32
Beech	62	10,400	826	<50	<126	23
Longden	55	40,890	4645	<50	<126	<155
O'Dowd	57	70,790	1222	<50	<126	<155
Jamieson	63	70,790	533	<50	<126	<155
Perkins	62	49,890	3480	<50	<126	100
Kilkudden ..	17	23,390	9817	<50	<126	71
Ryan	23	49,890	7798	<50	<126	18
Abrahams	?	27,230	5420	<50	<126	100
Rowan	18 months	708	86	<50	<126	<155

Abrahams, possessed indices of 100 against this latter virus. The values for the Japanese encephalitis virus were in all instances less than 126.

Complement Fixation Tests: Time of Appearance of the Antibody and its Course.

Seventy-nine specimens of convalescent sera taken up to 16 weeks after the onset of the illness were available; 37 of these were accompanied by corresponding sera obtained in the acute phase. Because of the small amounts of sera available in some instances, the dengue I antigen was the only one which could be used on all sera. In addition to the above-mentioned sera, six specimens taken from patients with encephalitis in Melbourne, where arthropod-borne viruses are not known to occur, and six taken from aborigines in the Northern Territory during an influenza epidemic in 1951, and 11 obtained from a similar source under similar circumstances in 1954 were tested. All gave negative results. Thirty-seven acute-phase sera were found to give negative results, but the convalescent pairs of these gave positive results. The latest specimen to give a negative result was obtained on the fifteenth day after the onset of the illness. By the second week sera were beginning to give positive results (Table II). Between the third and seventh weeks 17 of 44 sera which gave positive reactions possessed titres of 80 or more, and of 35 sera taken between the eighth and sixteenth weeks, four which had previously given positive results gave negative results, and only seven had titres equal to or higher than 80. In Table III are presented the results of tests performed when sera from two periods of convalescence were available. In all except one the titre had fallen with lapse of time, and four which had previously given positive results gave negative results. From the manner in which the investigation had to be conducted, namely, visiting the area during the outbreak to obtain acute phase specimens and returning some 50 days later to collect convalescent specimens, no opinion can be offered as to how often in the presence of what is clinically undoubted dengue fever the complement fixation test continued to give negative results.

From the results of the neutralization tests, it is concluded that a virus allied to the dengue I virus was the cause of the epidemic. From the foregoing results it is seen that the complement fixation reaction with the dengue I virus in the absence of infection is negative, and begins to become positive during the second week after the onset of the illness, and that the titres tend to be highest from the third to the seventh week, and then fall, in some cases the reaction becoming negative. The earliest positive result was obtained on the twelfth day after the onset.

Cross Fixation with other Arthropod-Borne Viruses.

Some of the sera from early cases had been found by Mr. C. G. Ludford and Mr. I. Cook, of the Queensland Institute of Medical Research, to give positive fixation with the Murray Valley antigen (Ludford and Cook, 1957). These were also found to give positive results with the dengue I antigen. Of 14 sera examined in this series, nine gave positive reactions to both antigens and five to the dengue I antigen alone. The other viruses were not available at the time of performance of these tests. These sera were all obtained during the third week of the illness, and those which failed to react with the Murray Valley antigen probably did so because the heterologous antibody had not yet appeared. Later, a larger series were examined with the dengue II and West Nile viruses in addition to the other two. For 11 sera (Martin to Abrahams in Table V) the results of neutralization tests were available. Eight showed evidence of recent infection with a virus closely allied to the dengue I strain, and in three one could not be certain which of the two dengue viruses was involved, as already pointed out. As will be seen in Table V, there is in most cases fixation with all four antigens, and in some cases to high titre with the heterologous antigens. Further evidence of this is seen in the results found with other sera presented in the table, for

TABLE II.

Distribution of Complement Fixing Titres in 79 Sera at Various Stages of Convalescence.

Titre.	Number of Sera Found Weeks After Onset.															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1280	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—
640	—	—	5	1	1	—	1	—	—	—	—	—	—	—	—	—
320	—	—	1	—	—	—	2	—	3	—	—	—	—	—	—	1
160	—	—	1	—	—	1	—	—	1	—	—	—	—	—	—	—
80	—	—	2	—	1	—	—	1	1	—	—	—	—	—	—	—
40	—	2	1	—	1	2	1	1	4	1	1	2	2	—	—	—
20	—	1	3	1	1	—	—	1	5	—	—	—	1	—	—	1
10	—	4	5	1	2	1	1	—	1	1	—	—	1	—	—	2
0	33[1]	3[1]	1[2]	—	—	—	—	1[2]	1[2]	—	1[2]	—	—	1[2]	—	—

[1] Acute-phase sera which later gave positive results.

[2] Convalescent sera which gave negative results, but had previously given positive results.

which evidence of neutralizing antibody content was not available.

One group of five sera which were received gave very confusing results, in that they gave negative results with the dengue I antigen and positive with the Murray Valley and West Nile antigens. They are shown in Table VI. The amounts received were small residua from other tests, and further investigation was not possible. In view of the fact that the sera taken in the acute phase reacted negatively with all three antigens, the results cannot be looked on as due to antibodies persisting from past infection with the Murray Valley virus, which is known to have occurred in this locality. At the time of performance of these tests, the strength of the dengue antigen preparation was low, and it had to be used undiluted. Although on the days on which these sera were examined in groups of 12, 12 and 20 and positive results appeared with 3, 4 and 5 other sera, the highest titre was 80 with one and 40 or less with the others. Also, the titres found with the West Nile and Murray Valley antigens are of a low order, and it is thought that the most probable explanation of the results is that the dengue antigen was too weak to detect small amounts of antibody. In Table III will be seen four examples of the titre to the dengue I antigen being less than that to the Murray Valley preparation. The findings, although unsatisfactory, are reported to emphasize the necessity for the use of high titre antigens in the most sensitive complement fixing system practicable, and also to illustrate the fallacious diagnostic and epidemiological conclusions which can be drawn, if one relies on the complement fixation test for the investigation of this group of infections.

TABLE III.

Complement Fixation Titre (Dengue Type I Antigen): Changes with Effluxion of Time where Two Convalescent Sera from Individual Cases were Available.

Case.	Days After Onset.	Titre.	Days After Onset.	Titre.	Days After Onset.	Titre.
Row. ..	15	Tr	30	64	50	<8
Mar. ..	2	<8	18	1024	118	256
Norr. ..	2	<8	22	256	86	40
Coll. ..	1	<8	20	32	88	10
McL. ..	2	<8	18	10	108	40
Mos. ..	—	—	29	32	76	<8
Fiel. ..	—	—	40	40	94	<10
Stir. ..	—	—	47	256	62	256
Rya. ..	—	—	23	512	83	40
McH. ..	—	—	23	32	62	8
Perk. ..	—	—	13	10	62	40
Hol. ..	—	—	33	512	90	20

TABLE IV.

Complement Fixation Results on Sera Using Dengue Type I and Murray Valley Encephalitis Antigens.

Serum.	Complement Fixation Titre.		
	Days from Onset.	Dengue I.	Murray Valley Encephalitis.
Mart.[1]	18	1024	320
Iron.	20	512	640
Need.	17	640	80
Nils.	17	512	320
Coll.	20	32	320
Stab.	20	256	320
Hud.	14	64	640
Norr.	21	128	640
Prior.	?	512	640
Ell.	19	8	5
Dagg.	19	8	5
McG.	14	8	5
McL.	17	8	5
Jon.	20	16	5

[1] All sera obtained in the acute phase gave negative reactions with both antigens.

Discussion.

Neutralizing Antibodies.

There has been shown by the neutralization test (Smithburn, 1954), by the complement fixation test (Sabin, 1949; Schlesinger *et alii*, 1952) and by the haemagglutination inhibition test (Casals *et alii*, 1954; Sweet *et alii*, 1954) that there is a varying interrelationship between certain members of the arthropod-borne group of viruses. The picture is not completely clear-cut, and at times, as the experience of Smithburn (1954) with Japanese encephalitis, West Nile and St. Louis viruses indicates, failure to demonstrate relationships previously regarded as established has occurred. The virus neutralization test is generally regarded as being the most specific of the tests cited, but Smithburn (1954) found that, after a double immunization in the experimental animal with two closely related viruses, the titre of the neutralizing antibodies evoked may be higher to the first than to the second infecting virus, and there may also appear antibody capable of reacting with still other viruses. The problem becomes more complex when human convalescent sera are studied, when the possibility of previous inapparent infections has to be considered. The same author gives examples of plural neutralization, often to a high titre, of heterologous viruses with convalescent St. Louis and Japanese encephalitis serum. Smithburn *et alii* (1954) reported four sera in which the neutralization against Murray Valley virus ranged from 3·0 to 3·3 logs, and against Japanese encephalitis from 3·5 to 4·9 logs, each serum being more potent against the Japanese virus. No doubt, in addition to past immunological history, the period in convalescence at which the sera are collected influences the results. Thus, Smith (1956) found a high content, at three weeks, to the dengue II virus in serum taken from a patient from whom a dengue I virus had been isolated. With these reports in mind, it seems highly probable from the results in eight of the neutralization tests that a virus closely allied to the dengue I was the cause of the infection. In the three instances in which

TABLE V.

Complement Fixation Tests with Convalescent Sera Against Four Viruses.

Serum.[1]	Days from Onset.	Complement Fixation Titre.			
		Dengue I.	Dengue II.	Murray Valley Encephalitis.	West Nile Fever.
Martin ..	18	1024	N.T.[2]	100	N.T.
Fowler 1 ..	2	<10	<10	<10	<10
Fowler 2 ..	51	320	80	20	10
Sterling ..	47	256	80	20	20
Beech ..	62	10	40	<10	<10
Longden 1 ..	1	<10	<10	<10	<10
Longden 2 ..	55	40	80	10	20
O'Dowd 1 ..	1	<10	<10	<10	<10
O'Dowd 2 ..	57	80	20	10	10
Jamieson 1 ..	1	<10	<10	<10	<10
Jamieson 2 ..	63	40	40	10	10
Perkins 1 ..	13	10	N.T.	N.T.	N.T.
Perkins 2 ..	62	160	80	80	80
Kilkudden ..	17	>80	80	>80	>80
Ryan	23	512	80	80	80
Abrahams ..	?	80	80	80	80
Har., Mr. ..	70	40	N.T.	20	40
Har., Mrs. ..	65	40	N.T.	20	20
Beth 1 ..	?	10	N.T.	<10	<10
Beth 2 ..	?	10	N.T.	80	40
Nol 1	12	10	<10	<10	<10
Nol 2	30	20	20	20	20
Mars 1 ..	?	160	N.T.	80	40
Mars 2 ..	?	80	N.T.	20	40
Star 1	?	160	N.T.	40	40
Star 2	?	320	N.T.	80	40
Bats 1	?	320	N.T.	320	320
Bats 2	?	640	N.T.	320	320

[1] Sera from the first 11 subjects were also used in the neutralization tests.

[2] N.T. indicates that no test was performed.

the neutralizing antibodies to the dengue II virus were of the same order of magnitude as those to the dengue I, it would appear, in view of Smithburn's experimental findings, unwise to draw any conclusion, other than that these three subjects may have suffered at various periods infection by both the dengue viruses, but no opinion could be offered as to which one was the cause of the more recent illness. No acute-phase sera were available to settle the point. Sabin (1952*b*) has found that heterologous protection between the dengue viruses is not long lasting. It may be remarked that the three subjects concerned were natives of the area, resident there for 20 years or more. Of the eight others with high neutralizing indices, six were young Service personnel who had only been in Townsville less than 12 months. Of the history of the others, the writer has no personal knowledge. By means of protection tests performed on the sera of fruit bats collected in the district, Rowan and O'Connor (1957) have obtained evidence suggestive of the presence at some time or other of the two dengue viruses.

TABLE VI.

Cross Fixation with Murray Valley and West Nile Antigens in Sera which gave Negative Reactions with the Dengue I Antigen.

Serum.	Days from Onset.	Complement Fixation Titre.		
		Dengue I.	Murray Valley Encephalitis.	West Nile Fever.
Cini 1	4	<10	<10	<10
Cini 2	37	<10	10	40
Russo 1	2	<10	<10	<10
Russo 2	17	<10	10	20
Spagn. 1	1	<10	<10	<10
Spagn. 2	30	<10	40	20
Lark. 1	?	<10	<10	<10
Lark. 2	?	<10	80	40
Buf. 1	2	<10	<10	<10
Buf. 2	24	<10	20	10

The low order of protection obtained in one instance with the Murray Valley virus and in three instances with the West Nile virus could be related to the known presence in the past of Murray Valley infection (Anderson, 1954; Ludford and Cook, 1957). Rowan and O'Connor (1957) have obtained evidence of the presence, by means of the mouse protection test, of antibodies to this virus and to Japanese encephalitis and West Nile fever as well. In view of the inherent nature of the test and the well-known serological interrelations of these three viruses, the findings could be explicable by the presence in the past of Murray Valley infection. The results in this small series, taken together with the reports of Anderson (1954) and Ludford and Cook (1957), indicate the necessity for intensive attempts at virus isolation to elucidate the serological findings, which have every prospect of being as complex as has been found in other parts of the world, where the arthropod-borne group of viruses exist.

Complement Fixing Antibody.

Kerr (1952), in a study of a series of arthropod-borne viruses including dengue I and West Nile, found no evidence of cross relationship, but the antisera employed were hyper-immune guinea-pig sera, and the homologous titres were of low order. Sabin (1949) found that dengue I convalescent human sera reacted in the complement fixation against West Nile, Japanese encephalitis and yellow fever antigens. Schlesinger (1952) found crossing between the two dengue viruses. The findings recorded here point to the existence of a considerable degree of cross fixation. In Table V, of 11 sera in which evidence of recent dengue infection is supported by the evidence of neutralization tests, eight gave positive reactions with the dengue I and II, Murray Valley and West Nile viruses; one, Martin, was tested only against dengue I and Murray Valley and gave positive reactions against both; one, Perkins 1, was examined initially only against dengue I, and the later specimen gave positive reactions against all four viruses, and one, Peach, gave positive reactions against only the two dengue viruses, at 62 days, and then only in a low titre, so that by then the heterologous antibody level may have been declining as the homologous level has already been shown to do. The remaining nine sera, which are not supported by figures for neutralizing antibody content, further illustrate the extensive cross fixation relationships existing when human convalescent sera, obtained during an epidemic of dengue-like fever, are examined in the complement fixation test with antigens prepared from the two dengues, the Murray Valley and West Nile viruses. Even though there may be practical difficulties in maintaining a constant supply of high titre antigens capable of resolving to some degree the confusing interrelationships existing in the complement fixation reaction among members of this group, the test is not without value in the investigation of these infections. It can be carried out along with the Wassermann tests in a clinical diagnostic laboratory, thus enabling such laboratories in regions where these infections are known to occur to keep a watch for their appearance, thereby economizing the effort required to be expended by laboratories specializing in virus research in their search for active foci from which to obtain material for investigation. In addition, the test offers some assistance, even if belated to practitioners in tropical areas, for narrowing down the diagnosis of the fevers with which they are confronted.

Summary.

1. The results of serological investigation by means of the virus neutralization test and the complement fixation reaction of material obtained during an epidemic of dengue-like fever in Townsville are described.

2. The findings support the conclusion that dengue I, or a closely allied virus, was present, and that in the presence of it considerable neutralizing antibody appears toward the dengue II virus, but not to the Murray Valley, Japanese encephalitis or West Nile viruses. There has probably been dengue II virus present in the locality, but no conclusion can be drawn as to whether it was the cause of cases in the epidemic investigated.

3. Human sera, which on the basis of neutralization tests appear to have come from individuals who have experienced infection with a virus of the dengue type I only, show, in the complement fixation reaction, considerable cross fixation with the dengue type II, Murray Valley and West Nile viruses.

4. Despite the lack of specificity of the complement fixation reaction, it is suggested that it could be used with benefit in diagnostic laboratories situated in areas where infections by this group of viruses are known to occur.

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THE USE OF OBSTETRIC FORCEPS TODAY.[1]

By Roland Nattrass, F.R.C.O.G.,
Perth.

One of the most likely means of furthering the reduction in infant mortality, and especially infant morbidity, lies in the continuation of a campaign to increase our knowledge in the correct use of obstetric forceps. Without doubt, forceps are the most effective means for success in the armamentarium of the obstetrician; but it is surprising how frequently they are misapplied. For this reason I make no excuse for yet another paper on forceps delivery.

In an attempt to diminish the number of misfits from intracranial injuries coming into the world, it behoves every obstetrician from the most junior up to continue to increase his knowledge about forceps delivery. Every obstetrician must have realized that on occasions his judgement and skill with forceps have been at fault, and with disastrous consequences. We must all aim to lessen the number of these occasions. Gone are the days when our aim was satisfied if a live baby was produced. We must produce perfectly fit babies.

Forceps delivery is indicated only in the interest of the mother or her child, and must be based on sound obstetrical knowledge. In general, the indications uniformly accepted are fœtal or maternal distress; but today we prefer to anticipate the arrival of this distress rather than to wait until it is actually present. The most reliable criterion of fœtal embarrassment in labour is the fœtal heart rate, especially when the rate falls to 100 or less between contractions; but our aim is to anticipate this distress and deliver the baby before it occurs. On the maternal side, we do not wait until there is too much stress and strain to the mother. We anticipate these embarrassments, and by the early use of the forceps, often under the time factor alone, we spare the parturient much distress. But remember that early interference, unless the necessary conditions are fulfilled which must be present before forceps can be applied, is more dangerous than leaving the patient to deliver herself.

The use of forceps is undoubtedly increasing, but the more frequent use of forceps, if skilful, is a conservative rather than a radical procedure, and the incidence of intracranial injuries will diminish despite this constantly increasing operative rate. The hasty termination of labour for the obstetrician's own convenience is, of course, reprehensible, and the incorrect use of forceps is no doubt responsible for a large number of stillbirths and of idiots among infants who survive, to say nothing about permanent maternal damage. So the successful use of forceps requires that one must know the correct indications for and contraindications to their use.

With the increase in safety of abdominal delivery the need for the older absolute indications for Cæsarean section have largely disappeared, and we are learning not to be afraid of admitting defeat with forceps. Fortunately, such procedures as destructive operations on the fœtus, Cæsarean section after hours of neglected labour, or highly traumatic forceps delivery, common twenty years ago, are rare today.

There is always much talk about the advantages of the many types of forceps one may use. I agree with De Lee, who said that it is the man behind the forceps rather than the instrument that counts. Personally, I should like to see all forms of axis traction discarded. Such a dangerous strength of pull should never be necessary and is usually bad obstetrics.

With regard to the time factor for the application of forceps, I agree that there should be no absolute time limit on the duration of anything connected with labour, and realize that its progress must depend on the severity of the labour and on the general conditions of the mother and the baby. Nevertheless I believe that the earlier routine use of forceps when the second stage of labour is delayed is superior to permitting a long, exhausting second stage; and, provided the use of forceps is limited to cases in which conditions are favourable to their application, it should make possible a lower fœtal loss without an increase in maternal morbidity.

At King Edward Hospital, in Perth, we have rules regarding this time factor. If a primipara has had a fully dilated cervix for two hours, or a multipara for one hour, the sister must notify the obstetrician, to give him the opportunity of reassessing the case with a view to operative delivery. He does not necessarily deliver the patient with forceps at this time. On the other hand, there is a tendency to make this second stage even shorter than these times, but this depends much on the condition of the fœtus and the mother.

Again, any case in which the head has been on the perineum for one hour must be reported. I firmly believe that the baby should be delivered at or before this hour, preferably in half an hour, because prolonged pressure against an unyielding perineum must cause intracranial damage. A prophylactic episiotomy is often all that is necessary to make delivery easy. On the other hand, a gentle "ironing out" of the perineum, followed by correct application of forceps and their removal as soon as the head crowns the perineum, will lower the incidence of perineal lacerations or incisions.

Incidentally, the forceps should be used here as much for guidance as for traction, and some expert obstetricians like to use them in all cases for this reason alone. Twenty-five years ago, Fletcher Shaw told me that for this guidance reason his aim was to deliver 100% of his private patients with forceps.

In any case of difficulty in delivery with forceps it is important to know that there are three main causes:

[1] Read at a meeting of the Section of Obstetrics and Gynæcology, Australasian Medical Congress (B.M.A.), Tenth Session, Hobart, March 1 to 7, 1958.

(i) disproportion, (ii) incomplete cervical dilatation, (iii) malposition of the fœtal head.

Disproportion.

Pelvic pelvimetry has helped us in recognizing disproportion before confinement, although in most cases a trial of labour is still indicated and our clinical judgement continues to be the most important factor.

There must be no reasonable insuperable obstruction after the correct application of forceps. Gone forever are the days of legitimate "high forceps" deliveries. The time has now come to abandon mid-forceps extractions. I am convinced that there is practically no place for a mid-forceps operation, as the number of resulting intracranial injuries and maternal mutilations does not warrant such a method of delivery. These mid-forceps operations can be avoided by careful vaginal, or preferably rectal, examinations during labour, to watch descent of the head.

Mid-plane obstruction can usually be anticipated in time to perform Cæsarean section rather than a hasty forceps extraction.

Incidentally, if forceps are applied and the manœuvre fails, I would not consider a version with extraction, which may have been recommended some years ago.

The most important recent advance in forceps delivery is our diminishing fear of admitting defeat. I am a complete believer in Jeffcoate's plea for the use of trial of forceps. Brute force is usually bad obstetrics. If excessive traction appears to be needed, then abdominal delivery is now the policy.

In most cases in which fœtal injury results, the disproportion falls into the borderline classification, and I am sure it is not always possible for an obstetrician to tell when he will fail in a forceps delivery. So if you have doubt about the outcome of a forceps delivery, the operating theatre should be ready for a low-segment Cæsarean section.

Cervical Dilatation.

One of the real abuses of the forceps operation arises not in the frequency with which it is used, but rather in the attempts to apply the blades through an undilated cervix. The use of forceps is primarily an operation restricted to the second stage, and there is little place for active intervention until the cervix is fully dilated.

In an emergency, when immediate delivery is imperative and the cervix is the only obstructing factor, I have found it justifiable, in a multipara, to fully dilate, manually, a cervix which is well thinned out and more than three-quarters dilated; but even with this one is inviting lacerations of the cervix. This should not be considered in a primipara.

Incision of the cervix by Dührssen's incisions should have an extremely limited field, because of their associated dangers and the relatively greater safety of Cæsarean section.

Malposition of the Head.

Because of the frequency of occipito-posterior positions, malposition is probably the most common complication of forceps deliveries.

To extract a child forcibly in the face-to-pubes position, in my view, amounts almost to criminal negligence. The dangers to mother and child are increased enormously. Admittedly, it is not always easy to rotate the head, especially if it is in deep transverse arrest; but with practice this manœuvre will be successful.

For me, manipulation with the fingers is the method of choice; but many operators prefer the aid of Kielland's forceps to correct the abnormal position of the head. Rotation with the ordinary forceps should be absolutely disallowed, owing to the likelihood of extensive mutilation of the vagina. Moreover, I believe that a fœtus in the occipito-posterior position with the head on the perineum should always be rotated to an occipito-anterior position before application of the forceps. In a neglected case, with much moulding, the forceps often cannot be applied satisfactorily, even if the presentation is converted into an occipito-anterior one; hence some operators prefer to leave the fœtus in the posterior presentation. I am sure that such a presentation is better converted to an anterior position, and again stress the point that the fœtal head should never have been allowed to progress to this stage of excessive moulding.

Obviously, one of the most important points in relation to malpositions is their diagnosis. Never apply forceps without a thorough diagnosis of the presentation.

For me there is only one method of being sure of one's diagnosis, and this is by palpating the ear. How near the mark was the bridge-player who said that the ear was the trump card in obstetrics; when in doubt, lead trumps. To teach any young obstetrician to rely on palpating the suture lines for diagnosis is absurd, because in difficult cases with much caput succudaneum, he cannot feel the suture lines. How much more sensible it is to let him learn to feel an ear in the less difficult cases so that he will be more expert in the not so easy ones. Remember, if you cannot feel the ear with your right hand in the vagina, then you will be inserting your left hand. Sometimes a slight upward displacement of the head may be necessary.

If the presentation is occipito-posterior, commence rotation with your fingers and continue until the occiput has just passed the median line, and then apply whichever blade of the forceps is more likely to hold the head in position and prevent backward rotation. If the head will not rotate easily at the level at which it lies at the beginning of the manœuvre, it may be necessary to displace it upwards. Just occasionally it may be necessary to retain the rotated position by turning the shoulders as well. Naturally, good anæsthesia is an advantage.

Another factor which is often stated as being a necessity before the application of forceps is the presence of uterine contractions. In these days of effective oxytocics, I believe this factor to be unnecessary; so also is the too often repeated phrase that the membranes must be ruptured before the application of forceps.

The After-Coming Head.

Before completing this address I should like to add my thoughts on the use of forceps on the after-coming head in breech extraction. I consider it a routine procedure and one of the most life-saving in obstetrics, because it not only allows the head to be delivered as slowly as is necessary, but also protects the head from the sudden contraction, and equally sudden relaxation, of pressure of the soft parts, which we know to be a common cause of intracranial injuries.

Many obstetricians consider that the application of forceps on the after-coming head is necessary only in the difficult cases. So again I suggest that the student be allowed to learn in the less difficult cases so that he will be an expert when he has to deal with the more difficult cases. Here, as in other forceps deliveries, good anæsthesia is essential. Pudendal blocks are sufficient in many cases; but to me the use of general anæsthesia is the method of choice. Our next big advance in forceps deliveries will come when we can develop a perfect liaison between obstetrician and expert anæsthetist.

Conclusion.

In conclusion, I should like to add that most problems in obstetrics can be solved by immediate reference to textbooks, but the successful use of forceps has to be learnt by practical experience — and often bitter experience. In the hands of the inexperienced obstetrician there is no more dangerous weapon than the forceps. The practical obstetrician who knows the indications and contraindications for the prophylactic use of forceps has in them the means of saving both mother and child much temporary distress and much permanent damage.

Reports of Cases.

SCIRRHOUS CARCINOMA OF THE BREAST ACCELERATED BY PREGNANCY.

By John McCaffrey,
Brisbane.

The challenge of breast carcinoma remains despite the varied onslaughts launched against it over the years. It has been estimated by Trimble and Lewison (1957) that almost 4% of the adult female population of the U.S.A. will develop breast cancer. It is one of the few neoplasms which demonstrate hormone dependence. The extent of this dependence has been the subject of a vast amount of experimental work in England and the United States. The treatment of breast cancer by hormones or by operations on the endocrine system has been established for a number of years (Huggins, 1954), and it is based on this experimental work. The two articles by Hadfield (1957, 1958) summarize recent developments in the experimental physiology of breast tumours, and should be consulted by all interested in this field.

The so-called acute carcinoma of pregnancy and lactation is well known to most clinicians. An excellent description of the macroscopic and microscopic pathology is given by Illingworth and Dick (1956). Usually, it presents with all the signs and symptoms of breast inflammation, and may even be treated as such. Such florid tumours tend to occur in lactation; those occurring during pregnancy may not be so "acute" (Handley, 1957). Both types, however, have the same basic histological pattern of poorly differentiated masses of epithelial cells with darkly staining nuclei and many mitotic figures. They thus fall into Greenough's classification of "high malignancy" (Greenough, 1925).

The tumour in the case to be described appeared shortly after pregnancy and pursued a rapid clinical course, but it was a fairly well-differentiated scirrhous carcinoma.

Clinical Record.

Mrs. A., an Englishwoman, aged 49 years, was admitted to the Mater Public Hospital six months after she had been delivered, by Cæsarean section, of a healthy male baby. It was her first child and her first pregnancy. Her presenting symptoms were severe lower back pain, radiating to both groins, and severe dyspnœa. She had been well until the sixth month of her pregnancy. Her menstrual history revealed that the menarche had occurred fairly late in life (at 15 years of age), and that her periods had always been irregular and scanty. In the sixth month of her pregnancy she developed hypertension with ankle œdema and albuminuria. She was admitted to hospital, and the toxæmia settled with diet and strict bed rest. At this time she first noticed vague low back pain, which was accentuated by lumbar flexion. Four days before the expected date of confinement the pregnancy was terminated by Cæsarean section because of the toxæmia and fears concerning the adequacy of her pelvis. The baby did well, and the patient made an uneventful recovery from the operation. She did not lactate, nor had her breasts undergone any obvious change during pregnancy. After her return home, the low back pain became very much worse. The month before her readmission to hospital it caused her great distress. She developed dyspnœa—at first with exercise, later at rest.

Examination revealed a thin rather cachectic middle-aged woman. Her lips and nail beds showed a cyanotic tinge, and she required oxygen intranasally to relieve her dyspnœa. She had a large right-sided pleural effusion. Examination of her back revealed a very tender area near the twelfth thoracic and first lumbar vertebral spines. There was no neuromuscular abnormality in the lower limbs. Abdominal examination showed a markedly enlarged liver with an irregular edge. There was a hard nodule deep to the umbilicus. The operation scar was well healed. Examination of the breasts showed no obvious abnormality of the left breast, except that it was rather atrophic. The right breast had two lumps in it. The first of these two lumps occupied most of the lateral half of the breast. It was hard and craggy and easily palpable with the flat of the hand. It was not attached to the skin or deep structures. There was no obvious nipple abnormality. The other lump was present in the supero-medial quadrant. It had the same characteristics as the first tumour, but was attached to the sternum in the region of the second costal cartilage. Examination of the right axilla revealed two small hard lymph nodes, which were freely mobile.

Investigations.

The pleural effusion was tapped, and blood-stained fluid was obtained. No neoplastic cells were found in this fluid. X-ray examination of the chest revealed widespread infiltration of both lungs with a right pleural effusion. (This skiagram was taken after paracentesis thoracis had been performed.) X-ray examination of the vertebral column showed replacement of most of the bodies of the twelfth thoracic and first lumbar vertebræ with osteolytic material and subsequent collapse of the bodies.

Clinical Course.

The clinical course was rapidly downhill; the patient died eight days after her admission to hospital. No hormonal therapy was tried in view of her poor general condition.

Autopsy.

At autopsy the clinical diagnosis of scirrhous carcinoma of the right breast was substantiated. There was widespread infiltration of both lungs with involvement of the mediastinal glands. The liver showed massive metastatic deposits. The adrenals and ovaries were also the sites of secondary metastases. The bodies of the twelfth thoracic and first lumbar vertebræ were largely replaced by neoplastic tissue. Sections of the primary tumour and its secondaries revealed the same histological picture—a fairly well-differentiated tumour with abundant connective tissue stroma. There were relatively few mitotic figures, and the cell pattern was quite regular.

Comment.

This case is reported because of the following unusual features: (a) it followed the first pregnancy of a woman aged 49 years; (b) there were no breast changes during or after the pregnancy; (c) the presenting symptoms were due to metastasis to the vertebral column and lung; (d) the tumour was a fairly well-differentiated scirrhous carcinoma.

There is some doubt in this case as to whether the tumour was present before pregnancy or not—certainly it was not detected at the routine breast examination at the ante-natal clinic. I believe that a small tumour was present, and that its growth was accelerated by the pregnancy. If this is the case, why did not the breasts show any changes during the pregnancy? Hadfield (1958) believes that growth of these hormone-dependent tumours is due to the same hormonal complex which causes normal mammary growth. Hence, in this case, either the normal breast tissue was not responsive to hormones or the tumour "used" all the available hormone for its own growth. The other interesting feature of the case is the relatively low malignancy (histologically) of the tumour associated with a rapid clinical course. This illustrates the difficulty of deciding on the malignancy of a tumour from examination of histological preparations.

Acknowledgements.

My thanks are due to Mr. Daniel Lane for helpful advice in the preparation of this paper. Permission to use Mater Hospital records was kindly given by Dr. E. D. O'Callaghan.

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Reviews.

Management of the Patient with Headache. By Perry S. MacNeal, M.D., F.A.C.P., Bernard J. Alpers, M.D., Sc.D. (Med.), F.A.C.P., and William R. O'Brien, M.D.F.A.P.A.; 1957. Philadelphia: Lea and Febiger. Sydney: Angus and Robertson, Limited. 7¾" x 5¼", pp. 148. Price: 38s. 6d.

THE authors of this small book are a physician, a neurologist and a psychiatrist, an ideal combination to cover the wide scope and ætiological ramifications of the symptom headache. The title implies that the book is concerned with the management of the patient rather than with the treatment of his symptom, and this is probably the most important key to success in the majority of cases of this complaint.

The first four chapters of the book deal with the physiological, metabolic, pathological and psychological mechanisms capable of producing pain in the head, and discuss the evaluation of various features of headache, which assist in the diagnosis of its cause. While the organic aspects are described in a simple manner suitable for undergraduate students, much time is spent on the discussion of complex psychological mechanisms and personality development, which are more in the field of the analytical psychiatrist. The chapter on the investigation of organic headache contains statements which could prove misleading to the reader who is not experienced in the interpretation of an electroencephalogram or in the indications for neuroradiological procedures. The authors' reluctance to advise cerebral angiography in the diagnosis of subarachnoid hæmorrhage is contrary to current opinion.

The classification into various types of headache attempts unnecessary detail, and "tension headache" and "psychogenic headache" are described in separate chapters without explanation of any apparent difference between them. An "allergic headache" is mentioned, but its description suggests the migrainous ciliary neuralgia which is treated more effectively with ergotamines than with the elimination diets suggested.

There is much needless repetition in the final chapter on diagnostic techniques. The book contains only 78 references, mostly to American authors, a rather inadequate selection from the vast literature on this subject.

For the specialist neurologist this book has little to offer. The general practitioner may find some guidance in the assessment of the personality of his patients with headache and in the decision which patients he should refer for specialist investigation; but he would probably prefer a more lucid description of the subject.

Polymyositis. By John N. Walton, M.D., M.R.C.P., and Raymond D. Adams, M.D.; 1958. Edinburgh and London: E. and S. Livingstone, Limited. 8½" x 5", pp. 280, with 47 illustrations. Price: 32s. 6d. (English).

A WELL-KNOWN American and a promising British neurologist, both with a wide experience in neuropathology, are the joint authors of this excellent monograph, which clarifies the understanding and formulates a new classification of a group of neuro-muscular disorders which has aroused considerable interest in recent years.

The book begins with a review of the literature and a description of the various types of polymyositis with or without associated skin changes and mentions the characteristic features of each type. The second chapter discusses previous attempts at classification and suggests a division into four groups, based on the observations of the authors' own series of 40 cases. The first three groups are distinguished by the complete absence or relative degree of associated "collagen disease", while the fourth group is concerned with polymyositis in association with malignant disease. The remainder of the book presents a description and analysis of the ætiological factors and clinical picture of the authors' cases and includes a critical discussion of the value of laboratory investigations. Particular attention is paid to electromyography, which frequently reveals characteristic changes of value in diagnosis.

The authors were fortunate in obtaining muscle biopsy specimens for histological examination from 35 of their patients. The chapter on pathology occupies almost one-third of the book and is illustrated by a large number of excellent photographs of microscopic sections. There are equally fine illustrations of some radiological and clinical features, some of them in colour. An appendix to the book gives lucid and concise clinical histories of all 40 patients.

As a result of their studies, Walton and Adams conclude that polymyositis, dermatomyositis, menopausal muscular dystrophy, late-life muscular dystrophy, generalized myositis fibrosa, carcinomatous myopathy and interstitial nodular myositis in association with a "collagen disease" all appear to be variants of a single syndrome which has many different modes of presentation. The results of treatment with corticotrophin and cortisone are critically evaluated and the success achieved in a significant proportion of cases shows that the early correct diagnosis of these conditions is not merely of academic importance.

This book sets a standard of excellence for a monograph which will be difficult to surpass. It cannot be too highly recommended to the physician, neurologist, pathologist or, indeed, anyone interested in the study of advances in medicine.

Milestones in Modern Surgery. By Alfred Hurwitz, M.D., and George A. Degenshein, M.D.; 1958. New York: Hoeber-Harper Book. 9" x 6", pp. 244, with many illustrations. Price: $15.00.

IN these days of turbulent, headlong progress, everyone involved in the practice of medicine has difficulty in keeping abreast of the most recent thinking. Until recently, one knew from a study of what had gone before roughly in what direction we were heading, and the lessons of history were both clear and comforting; however, there are few nowadays who are prepared to spend time taking a long look back to try to help them cope with the problems of the present. But if time for a quick glimpse over the shoulder can be spared, it is as well to have a clear, concise guide to the events of major importance which have occurred in one's particular branch of endeavour in the recent past. To cater for this need, Alfred Hurwitz and George A. Degenshein have compiled "Milestones in Modern Surgery", and have achieved in this a happily suitable collection of abbreviated monographs on the majority of the most significant contributions of the past century. In no way is this a review of all the important and fundamental developments in surgery; rather is it a brief survey of the major factors concerned in the development of truly modern surgery. The authors are both New York surgeons and therefore those features in modern surgical development which they regard as most significant are naturally drawn essentially from the American and European scenes.

However, one cannot cavil at any of the selected inclusions, as they are all of first importance; but a British or Australian author would certainly have made a very different collection of contributions. This aspect alone is of more than passing interest, and the contents of this volume probably give a reasonably accurate estimate, not only of past achievements, but also of those aspects of surgery which are regarded as of first importance in current American thinking.

Each section is introduced by a brief and highly informative prefatory annotation. The amount of information in these remarks is sometimes startlingly great, and to anybody interested at all in surgery there is little of this book which he will not find of great and deep interest. To the average Australian surgeon many of the names are well known. We found it absorbing to have a thumb-nail sketch provided of many of the surgical great whom we identified with perhaps a single procedure, only to discover to our surprise that many other major contributions had come from each individual source. To those engaged in teaching surgery this book must have a particular appeal. To anyone interested in extending the breadth and depth of his surgical knowledge with a minimum of effort and a maximum of appeal, this collection is to be recommended.

The Reticulo-Endothelial System in Growth and Tumour Formation. By Roger Wyburn-Mason, M.A., M.D., M.R.C.P.; 1958. London: Henry Kimpton. 9½" x 7", pp. 208, with 79 illustrations. Price: 42s. (English).

THIS thesis presented in this work is that the macrophages of the reticulo-endothelial system are responsible for the nutrition of normal parenchymal cells. Control of their activity is chiefly through unmyelinated nerve fibres with which they are associated. Tumour formation is thought to be due to somatic mutation, and malignant tumours are characterized by absence of unmyelinated nerve fibres and

macrophages. When macrophages do happen to be present the growth and metastasizing ability of the tumour are inhibited. Co-carcinogens such as croton oil destroy macrophages and thereby permit the latent activity of mutant cells to become overt.

Throughout this book there are conclusions derived from processes of logic built upon suppositions such as the following: "It appears likely, therefore, that interstitial cells and some at least of the basket ('myo-epithelial') cells, Hellen-Zellen, 'clear' cells and Langerhans cells are identical in nature and no more than reticulo-endothelial cells and that satellite and Schwann cells are specialized cells of the same nature." Thereafter the author refers to the types of cells quoted as macrophages and draws conclusions based upon that interpretation.

Although it is doubtful whether there is any important contribution to knowledge in this volume, there is an extensive list of references for anyone interested in the problems of inflammation and carcinogenesis, totalling 582 in all.

Books Received.

[The mention of a book in this column does not imply that no review will appear in a subsequent issue.]

"Lymphocytes and Plasmacytes in Nucleoprotein Metabolism", by Margaret A. Kelsall and Edward D. Crabb; "Annals of the New York Academy of Sciences", Volume 72, Art. 9; 1958. New York: The New York Academy of Sciences. 9" x 6", pp. 44. Price: $2.00.

"The purpose of this work is to consider the available information for and against the tenet that lymphocytes and plasmacytes are primarily true trephocytes (feeding or nutritive cells) that synthesize and store nucleoproteins."

"Hodgkin's Disease", by Antonio Rottino, E. P. Benditt *et alii*; "Annals of the New York Academy of Sciences", Volume 73, Art. 1; 1958. New York: The New York Academy of Sciences. 9" x 6", pp. 380, with many illustrations. Price: $4.50.

A monograph compiled from a conference held in November, 1957.

"Hiroshima", by John Hersey; 1958. Mitcham, Victoria: Penguin Books, Limited. 7" x 4", pp. 128. Price: 4s.

A reprint of the account, first published in 1946, of the use of the first atom bomb.

"Genetic Concept for the Origin of Cancer", by Leonell C. Strong *et alii*; "Annals of the New York Academy of Sciences", Volume 71, Art. 6; 1958. New York: The New York Academy of Sciences. 9" x 6", pp. 434, with many illustrations. Price: $5.00.

Papers from a conference held in October, 1957.

"Third Tissue Homotransplantation Conference", by John Marquis Converse, Blair O. Rogers *et alii*; "Annals of the New York Academy of Sciences", Volume 73, Art. 3; 1958. New York: The New York Academy of Sciences. 9" x 6", pp. 330, with many illustrations. Price: $5.00.

Papers from a conference held in February, 1958.

"The Voyage of the Lucky Dragon", by Ralph E. Lapp; 1958. Mitcham, Victoria: Penguin Books, Limited. 7" x 4", pp. 176. Price: 4s.

The true story of the Japanese fishermen who were the first victims of the H-bomb.

"Alfred Hospital Clinical Reports", Volume 8; 1958. Melbourne: The Alfred Hospital. 9½" x 5½", pp. 114, with 10 illustrations and 15 tables. Price not stated.

The Alfred Hospital's annual clinical publication.

"The Year Book of Medical Sciences, 1958", edited by Madhusudan M. Desai, M.D., F.C.P.S., F.R.F.P.S.(G.), D.T.M.H. (Eng.), Dhirubhia B. Doshi, M.R.C.P., D.T.M.H. (Eng.), and Noshir H. Wadia, M.D., M.R.C.P. (Lond.); 1958. Bombay: Current Technical Literature Company, Private, Limited. 9½" x 7", pp. 530, with many illustrations. Price: 75s.

The first of an annual series.

"Progressive Exercise Therapy in Rehabilitation and Physical Education", by John H. C. Colson, F.C.S.P., M.S.R.G., M.A.O.T., with a foreword by J. M. P. Clark, M.B.E., M.B., Ch.B., F.R.C.S.; 1958. Bristol: John Wright and Sons, Limited. 8½" x 5½", pp. 196, with 174 illustrations. Price: 18s. 6d. (English).

Designed primarily for qualified physiotherapists, remedial gymnasts and physical educationists.

"Symposium on Nuclear Sex", edited for the Organizing Committee by the Secretary, D. Robertson Smith, M.A., M.D., and William M. Davidson, M.D., foreword by Professor Robert Platt, M.D.; 1958. London: William Heinemann (Medical Books), Limited. 8½" x 5½", pp. 208, with many illustrations. Price: 21s. (English).

The record of a symposium held at King's College Hospital Medical School, London, in September, 1957.

"Neo-Natal Pædiatrics", edited by W. R. F. Collis, M.D., F.R.C.P., F.R.C.P.E., D.P.H.; 1958. London: William Heinemann (Medical Books), Limited. 8½" x 5½", pp. 328, with 34 illustrations. Price: 30s. (English).

Designed to help those organizing neo-natal units in maternity hospitals, and as a guide to students and post-graduates studying the problem of the newborn baby.

"Principles of Radiographic Exposure and Processing", by Arthur W. Fuchs; 1958. Oxford: Blackwell Scientific Publications. 9½" x 7", pp. 304, with 159 illustrations. Price: 80s. (English).

For the X-ray technician.

"British Obstetric and Gynæcological Practice", edited by Sir Eardley Holland, M.D. (Lond.), F.R.C.P., F.R.C.S., F.R.C.O.G., and Aleck Bourne, M.A., M.B., B.Ch. (Cantab.), F.R.C.S., F.R.C.O.G.; Second Edition; 1958. London: William Heinemann (Medical Books), Limited. 9½" x 7", pp. 904, with many illustrations. Price: 105s. (English).

The first edition appeared in 1955.

"Staphylococcus Pyogenes and its Relation to Disease", by Stephen D. Flek, M.D., D.Sc., Ph.D., D.P.H.; 1958. Edinburgh and London: E. and S. Livingstone, Limited. 9½" x 5½", pp. 776, with illustrations. Price: 84s. (English).

The author is Professor of Bacteriology in the University of London.

"Hæmatological Technique for Medical Laboratory Technicians and Medical Students", by E. M. Darmady, M.A., M.D. (Camb.), F.R.C.P., and S. G. T. Davenport, F.I.M.L.T.; Second Edition; 1958. London: J. and A. Churchill, Limited. 9½" x 6", pp. 264, with four coloured plates and 23 text figures. Price: 24s. (English).

The first edition appeared in 1954.

"A Synopsis of Hygiene (Jameson and Parkinson)", by Llywelyn Roberts, M.D., M.R.C.P., D.P.H., assisted by Kathleen M. Shaw, M.B.E.; Eleventh Edition; 1958. London: J. and A. Churchill, Limited. 9½" x 6", pp. 702, with 22 illustrations. Price: 60s. (English).

The previous edition appeared in 1952.

"Rehabilitation Medicine", by Howard A. Rusk, M.D., and thirty-six collaborators; 1958. St. Louis: The C. V. Mosby Company. Melbourne: W. Ramsay (Surgical), Limited. 9½" x 6½", pp. 574, with 172 illustrations. Price: £6 12s.

A text-book on physical medicine and rehabilitation.

"Biochemistry and the Central Nervous System", by Henry McIlwain, Ph.D., D.Sc.; Second Edition; 1958. London: J. and A. Churchill, Limited. 9½" x 5½", pp. 296, with 34 tables. Price: 45s. (English).

The author is Professor of Biochemistry in the University of London at the Institute of Psychiatry (British Post-graduate Medical Foundation). The first edition appeared in 1955.

"Textbook of Physiology and Biochemistry", by George H. Bell, B.Sc., M.D., F.R.F.P.S.G., F.R.S.E., J. Norman Davidson, M.D., D.Sc., F.R.F.P.S.G., F.R.I.C., F.R.S.E., and Harold Scarborough, M.B., Ph.D., F.R.C.P.E., M.R.C.P.; Fourth Edition; 1959. Edinburgh and London: E. and S. Livingstone, Limited. 9½" x 6½", pp. 1080, with many illustrations. Price: 63s. (English).

The third edition appeared in 1956. Much of the book has been rewritten since.

The Medical Journal of Australia

SATURDAY, MARCH 7, 1959.

GROWING UP IN A CHANGING WORLD.

GROWING UP has never been easy for the majority. In our day it has not been made any less difficult by the state of their elders' world in which the young find themselves. Much has been talked about the resultant problems, especially when, in the form of juvenile delinquency, they have inconvenienced society. Less has been done about them, but this cannot be wholly ascribed to indolence and indifference. To some extent, at least, we have to admit that we do not know what should be done about them. It seems that there is still room for more talking about the matter and for persistent worrying at it until we reach an understanding of the problem and some solution to it. It is therefore not surprising that "Growing Up in a Changing World" should have been the theme of the tenth annual meeting of the World Federation for Mental Health, held in Copenhagen last year. A recently published volume[1] bearing the same title and containing the papers read at the meeting, will be of interest to many, and especially to those professionally concerned with children and adolescents.

The participants in meetings of the World Federation for Mental Health are international and interdisciplinary, and doubtless the promotion of international ties is the main value and purpose of meetings such as this, rather than the explicit discussion of subjects presented by the speakers. The opening paper, by Dr. Margaret Mead on "Growing Up in Different Cultures", stresses the new morality of internationalism, and the theme recurs in most of the other papers, up to the closing paper, by Dr. Brock Chisholm on "Growing Up in a Changing World", where it is frankly preached as a sermon. Dr. Mead states: "We have not yet wakened up to our new estate—that we live now in a world of plenty, that we are entering the age of free power in which material needs can be satisfied as never before, in which it will be possible to help those who are far away, as freely as those who live next door." Dr. Chisholm comments: "If we really looked at it, we might come to the conclusion that all our international boundaries are ridiculous . . . once we embark on the kind of course that we have set up for ourselves, there is, for each of us, no place to stop short of becoming a member of the human race."

However, if we leave aside the consideration of internationalism, important though it is, and turn to the explicit discussions about growing up, we find that one of the most interesting meetings was the panel discussion led by Dr. Alan Stoller, of Australia, entitled "The Prevention of Juvenile Delinquency". The questions usually aired whenever juvenile delinquency is discussed were raised, ranging from the severity of the problem to the effect of Hollywood movies and the remedial value of corporal punishment. The questions are, of course, familiar, but the answers, as one might hope from a W.F.M.H. panel, are more distinguished than usual and repay a brief account here.

A Canadian clergyman asked: "Is juvenile delinquency increasing? How much delinquent behaviour is never subject to conviction?" This drew from Dr. jur. Karl O. Christiansen, of Denmark, the comment that criminal statistics never can give us information about the total number of crimes. We can take note only of crimes which, in one way or another, have come to the knowledge of the authorities; and that may mean that in one period a considerable rise in statistics of crime may be registered, even if the total number of crimes committed has not changed. As an example from Copenhagen, Dr. Christiansen mentioned that a very clever and very earnest police commissioner had succeeded in "doubling" the number of cases of homosexual prostitution within a few years; but there was no reason to believe that an actual increase had taken place. He went on to say that another consequence of the existence of hidden criminality was that the subjects with whom contact was made, and who could be studied, and upon whom conclusions about crime must be based, were limited and perhaps unrepresentative as a sample of criminals; they represented only those who were going to be punished or treated in some way or other. At the previous session a speaker had stated that a certain age group of juveniles in the U.S.A. had shown a 7% increase from one year to the next, and that juvenile delinquency amongst the members of that age group had simultaneously risen by 14%. The speaker had regarded that as proof of a considerable increase in juvenile delinquency. Dr. Christiansen said that it was possible that he was right. It depended on whether the requisite detailed analysis of the figures and crimino-political practice had been made—which he hoped had been the case. However, it was also possible that the increase in juvenile delinquency might have resulted from increased activity on the part of the authorities enforcing the law. What could be seen most distinctly was a great increase in the concern for the behaviour of young people, and in a number of countries that interest seemed to be extremely one-sided. It seemed to be fashionable to maintain that young people nowadays were worse than were those of the previous generation, and juvenile delinquency figures were readily used to support the contention. Dr. Christiansen wondered whether it was not precisely this attitude in itself which might contribute to an increase in the number of offences committed by juveniles. In any case he was certain that it could contribute to an increase in the number of recorded juvenile offences; it had without doubt played a role in the so-called "leather-jacket" riots witnessed in

[1] "Growing Up in a Changing World"; 1958. London: World Federation for Mental Health. 8½" x 6", pp. 238. Price: 15s. (paper covers).

Copenhagen a week previously. He suggested that in efforts towards crime-prevention an interest should be taken in the attitude of the public to young people, in the Press reports of the situation and in police practice. He added that it was not his intention thereby to maintain that the problem of juvenile delinquency was insignificant. He merely wished to emphasize that a rational preventive criminal policy must be based on research, investigation of the extent of the problem and investigation of the underlying causes.

An American doctor voiced another perennial question: "Do you think emphasis on violence, in some American movies, stimulates anti-social juvenile acts in Europe and China?" Dr. P. M. Yap, of Hong Kong, suggested delicately that one really could not tackle the question of juvenile delinquency simply by concentrating on one factor and ignoring all the others. The child must be taken in his total social situation, and in his (Dr. Yap's) view, seeing violent behaviour in movies could not be a factor by itself. There must be predisposition towards delinquency by a combination of insecurity at home, poor social conditions, and so forth. Seeing violent behaviour might determine the form of the delinquent act, but it could not produce it. Dr. Christiansen agreed with Dr. Yap's point of view. He did not believe that violent scenes in movies were themselves able to produce criminality. He was extremely sceptical about the current popular view on the subject. From a psychological point of view, the question could be considered differently: whether that kind of picture would make possible a certain release of aggressive tendencies, which perhaps otherwise might have resulted in criminality. At any rate, it was probable that such pictures would satisfy a need for adventure, excitement and those experiences which were very difficult to obtain in a big city. In that connexion he pointed out that, in his book on young delinquents, Cyril Burt emphasized that he more than once had noted that the incidence of crime had fallen in a bad quarter when a cinema was established there. After all, the cinema provided a better resort for the young people than the street.

The third highly debatable question was asked by an American doctor: "Do you think that corporal punishment—striking—is valuable in institutions for treatment of juvenile delinquents, and should be permitted?" In reply, Dr. Kenneth Soddy, of the United Kingdom, was confident that punishment could work only as an instrument of correction if there was an abiding positive relationship between the punisher and the punished, and if the punished had the capacity to reform and the opportunity to do so. He thought that there were the strongest possible theoretical objections to any attempt by a juridical body to treat juvenile delinquency by punishment, or to "run the risk of driving a wedge between the child's capacity to love and to hate those who are in authority over him". He said that he could not hope to convince anyone by his answer, because everyone felt about these things as strongly as he did, and his answer would be the expression of his own emotional reaction to the question of beating, but perhaps he might rationalize and add that he thought the greatest disadvantage of the use of corporal punishment in institutions was the brutalizing effect it inevitably had on the punisher. For that reason, also, he was definitely, totally and absolutely against it. He thought that the question of the effect on the child who was punished could be dismissed by saying that he did not know how one could teach a child the control of aggressive impulses by putting him at the receiving end of the aggression. Dr. Soddy left no doubt that he was against corporal punishment.

Whatever answers were given to these questions, they would not please everybody. That cannot be helped. One point, however, on which we could seek to agree is that problems of juvenile delinquency will not be solved by carping criticism of youth by their elders. Something constructive is called for. In particular, where we are satisfied that life holds some purpose and pattern, we might well aim to make our conviction more practically obvious to those whose only crime is that they find life baffling. Certainly we may not shirk a large share of the responsibility for the problem. "The fathers have eaten sour grapes", said the prophet, "and the children's teeth are set on edge." A final word from Dr. Stoller helps to keep the subject on an even keel:

> We do tend, in our communities, to adopt attitudes which in themselves are to some extent responsible for making delinquents. For instance, we all talk about "Teddy Boys" or "widgies" and "bodgies" as being delinquents, which is a long way from the truth. Many adolescents go through this phase and develop quite well. Similarly, the identification of vandalism with juveniles is equally erroneous. A good deal of the vandalism in the community is actually carried out by adults.

Current Comment.

SERUM TRANSAMINASE LEVELS AND DISEASE.

In 1955 J. S. La Due and F. Wroblewski[1] demonstrated that under certain conditions when cells are damaged, particularly cardiac cells and hepatic cells, an enzyme which is present in the blood serum in small amounts may be greatly increased. This enzyme, which is present in all cells in varying degree, is glutamic-oxalacetic-transaminase (G.O.T.). The amount of it present is greatest in the heart, high in the liver and much less in other organs. Another similar enzyme, glutamic-pyruvic-transaminase (G.P.T.), is present in greatest amount in the liver and much less in the heart and kidneys.

La Due and his colleagues showed that a considerable increase in the amount of serum glutamic-oxalacetic-transaminase (S.G.O.T.) followed myocardial infarction in man and advised that estimations of S.G.O.T. were of considerable value in the diagnosis of myocardial infarction. Papers on this subject by M. N. I. Walters and Patricia G. Littlejohn,[2] of Perth, and N. M. Gutteridge and Coral J. McKean,[3] of Brisbane, have been published in this Journal. In both these papers the methodology of the test is discussed, and illustrative cases are quoted. Reports of some fairly long series of patients investigated by this method have recently been published, and provide further data from which to assess the prognostic and diagnostic value of the test. K. D. Keele, F. Goulden and M. J. D. Newman[4] have studied the value of the test in 135 patients with suspected cardiac infarction admitted into hospital "off the street". In 69 cases the electrocardiogram was accepted as diagnostic of recent cardiac infaction. In these cases the S.G.O.T. level began to rise as early as six hours after the onset of pain. The peak reading was usually at 24 and 48 hours and the level

[1] *Circulation*, 1955, 11: 871 (June).
[2] Med. J. Aust., 1958, 1: 76 (January 18).
[3] Med. J. Aust., 1958, 1: 528 (April 19).
[4] *Lancet*, 1958, 2: 1187 (December 6).

fell to normal in three to seven days. They found a highly significant correlation between the level of S.G.O.T. during the second day and the prognosis, as related to immediate mortality and the development of heart failure. In 25 patients a raised S.G.O.T. level was found, but the electrocardiogram did not show the usual changes. Twenty-one of these were diagnosed clinically as having cardiac infarcts. There were less than 2% of false negative findings. Anginal pain at rest associated with an abnormal but not diagnostic electrocardiogram and a raised S.G.O.T. level was found to carry the same prognostic significance as electrocardiographically proved infarction. A. J. Goble and E. N. O'Brien,[1] of Melbourne, have studied the significance of plasma-transaminase activity in cases of acute myocardial ischæmia. In this condition patients have episodes of cardiac pain which differ from those of angina pectoris in that the pain lasts for many minutes to several hours and is not relieved by rest or nitrites. The features of the electrocardiogram are not those of acute myocardial infarction. The names given to the condition focus attention on the coronary arteries, whereas the underlying abnormality is believed to be severe but transient ischæmia of the myocardium. Goble and O'Brien found what has been observed by other investigators, that intermittent or occasional estimations of S.G.O.T. gave figures which were within what is considered the normal range. When serial estimations of S.G.O.T. were made, there were definite increases, although the maximum was within the normal range. They consider that S.G.O.T. activity is a sensitive index of myocardial necrosis. In 12 of 18 patients with severe cardiac pain not associated with frank myocardial infarction, serial estimations of S.G.O.T. gave evidence of single or repeated episodes of myocardial necrosis.

Determinations of serum-transaminase activity have also been found to be very useful in hepatic diseases. Serum glutamic-pyruvic transaminase is found in relatively high concentration in liver cells, and in various forms of liver disease S.G.P.T. activity is often above normal levels, whereas in myocardial infarction it is not significantly raised. J. Pryse-Davies and J. H. Wilkinson[2] have studied the serum transaminase activity in diseased conditions of the liver and gastro-intestinal tract. Very high values of both enzymes are characteristic of infective hepatitis and carbon tetrachloride poisoning. Moderately high values occur in obstructive jaundice, glandular fever hepatitis and toxic hepatitis. Variable results were obtained in cirrhosis and liver metastases. Normal values were obtained in gastro-intestinal diseases not involving the liver. E. N. O'Brien, A. J. Goble and I. R. Mackay[3] used estimations of plasma-transaminase activity as an index of the effectiveness of cortisone in the management of chronic hepatitis. In four of five patients with active chronic hepatitis a pronounced fall in transaminase levels coincided with cortisone treatment, indicating that the cortisone reduced the rate of liver cell necrosis in these patients. In five patients with other types of liver disease cortisone had no effect on the transaminase activity of the blood. A. L. Latner and A. J. Smith[4] have shown that the S.G.O.T./serum alkaline phosphatase ratio can be of considerable use in the differential diagnosis of jaundice. When the ratio is above 7 in the presence of jaundice, the chances are good that the patient is suffering from hepatocellular disease.

[1] *Lancet*, 1958, 2:873 (October 25).
[2] *Ibid.*, 1958, 1:1249 (June 14).
[3] *Ibid.*, 1958, 1:1245 (June 14).
[4] *Ibid.*, 1958, 2:915 (November 1).

SUBMARINE MEDICINE.

IT may come as a surprise to many doctors to think of submarine medicine as a specialized branch of our science. However, the United States Navy has a special Submarine Medicine Division, whose work is discussed in three papers presented to the twenty-second Annual Congress of the United States and Canadian Sections of the International College of Surgeons. Its scope includes not merely the health of submarine crews, but also factors affecting orthodox helmeted deep-sea divers, innovators of the underwater swimmers' school, and such exclusive groups as underwater demolition units. Some of their problems are old, beginning with the selection of personnel for these specialized occupations, but some are new. In particular, the advent of the atomic-powered submarine has introduced a whole range of new problems. The fact that it is possible to house quite a large crew in such close proximity to an atomic reactor without exposing them to dangerous doses of radiation is essentially an engineering achievement. H. J. Alvis[1] states that exposure levels for most crew members are less than many people receive from sources not ordinarily classed as liabilities in this regard. However, an important part of the duties of the medical officer and his assistants on the *Nautilus* and *Sea-Wolf*, according to J. H. Ebersole,[2] is the maintenance of an elaborate monitoring system for any possible radiation leakage. An equally important aspect of the atomic submarine is its ability to remain submerged for weeks on end. This involves very careful control of the atmosphere inside the vessel. The maintenance of a proper supply of oxygen and the removal of carbon dioxide are but the beginning. The prevention or removal of any toxic substance which may be released into the submarine atmosphere presents a surprising array of problems. These substances include carbon monoxide (which, it is interesting to note, is derived mainly from tobacco smoke), gases from the refrigerating plant, and other known and unknown hazards. Many of these potential toxic agents were present in older types of submarine, but these vessels had to make contact with the atmosphere above, either openly or through a snorkel tube, at intervals which seldom exceeded 12 hours, and this prevented the accumulation of dangerous concentrations. From now on, as Alvis states, it will be necessary to know in advance the toxicological potential of every single item taken aboard a submarine for a cruise. As an example of the importance of low-level concentrations of contaminants over long periods, he quotes the fact that it has been necessary to ban radium-painted dials from submarines, including those on personal wrist watches.

The other new vista in submarine medicine is that opened up by the invention of the Cousteau-Gagnon demand valve, which permits a man to swim underwater, unhampered by surface connexions, while breathing compressed air from a flask on his back. The problems introduced by this invention are discussed by G. J. Duffner.[3] He points out that the effects of this invention have been threefold: it has widened the horizon of the military applications of diving, creating a new field for research into new aspects of human physiology; it has become a part of many commercial and scientific ventures; and it has created an attractive new sport of ever-increasing popularity. Old-fashioned helmeted divers worked according to a well-established set of rules, and the limitations and the dangers to which they were exposed were correspondingly well defined. The versatile frogman with a cylinder on his back exposes himself to many new hazards. Some of these were discussed in a paper on barotrauma by D. T. Burke[4] at the Tenth Australasian Medical Congress (B.M.A.) in Hobart last year. Others involve the curious effects of gases at different pressures. Pure oxygen when breathed at a partial pressure greater than two atmospheres becomes a convulsant; nitrogen under increased pressures becomes a narcotic. Duffner quotes what he terms "Martini's Rule": a dive to 100 feet is equivalent to one cocktail before dinner; a dive to 200 feet is equivalent to two cocktails, and so on. He states that at 300 feet a diver breathing ordinary air is practically ineffective. In the U.S. Navy helium-oxygen mixtures are used for diving to depths in excess of 200 feet to combat this effect. This is but a brief glance at some of the problems encountered, but all in all it seems that the Division of Submarine Medicine has plenty to think about.

[1] *A.M.A. Arch. industr. Hlth*, 1958, 18:195 (September).
[2] *Ibid.*, 1958, 18:200 (September).
[3] *Ibid.*, 1958, 18:208 (September).
[4] MED. J. AUST., 1958, 1:867 (June 21).

Abstracts from Medical Literature.

PHYSIOLOGY.

Effect of Posture on Blood Flow in Fingers and Toes.

B. S. L. KIDD AND R. V. MCCREADY (*J. appl. Physiol.*, January, 1958) discuss the effect of change in posture on the blood flow through the fingers and toes. They state that heat eliminations from the toes and middle finger of the human subject were measured calorimetrically when the subject was lying horizontally with the extremities at heart level and when he was standing erect with the extremities fully dependent. It was found that heat elimination from the finger was not significantly altered, but that heat elimination from the toes rose slightly on standing. Other experiments carried out were: (*a*) one in which the leg of a horizontal subject was lowered from heart level to a dependent position while the heat elimination from the toes was measured (the heat elimination was found to increase with dependency); (*b*) one in which the heat eliminations from the finger were measured at the heart level of a subject lying horizontally, and at heart level and when fully dependent while the subject was standing erect (no significant change was observed). It is concluded that centrally-induced reflexes oppose the local effects of increased transmural pressure and result in blood flow through the fingers and toes remaining virtually unaltered with change in posture.

Lymphatic Permeability to Albumin.

R. M. PATTERSON *et alii* (*Amer. J. Physiol.*, July, 1958) report that radioactive albumin was infused proximally into a lymphatic vessel in a leg of each of several dogs at a constant rate, the thoracic duct lymph and blood were sampled for 150 minutes, and the radioactive albumin in these fluids determined. The authors found that the infused albumin returns to the circulation primarily by the thoracic duct. Less than 3% of the infused albumin reaches the circulation by routes other than the thoracic duct except in unusual cases of right and left thoracic duct anastomoses. Lymph nodes do not phagocytize the serum albumin passing through them, and exchange of albumin between lymph and blood in lymph nodes is quantitatively insignificant.

Oxygen Deprivation in Fœtal and Adult Tissues.

C. A. VILLEE AND D. D. HAGERMAN (*Amer. J. Physiol.*, September, 1958) discuss experiments on the effect of oxygen deprivation on the metabolism of fœtal and adult tissues. They report that fœtal liver slices have a remarkably high rate of lipogenesis anaerobically as well as aerobically, shown by the incorporation of carbon-14 from pyruvate into lipids. In contrast, slices of adult or one-day-old liver have a much lower lipogenetic rate anaerobically than aerobically. Fractionation of the fœtal liver lipids showed that phospholipid and glyceride fatty acids are synthesized at essentially equal rates aerobically and anaerobically but cholesterol synthesis is much slower in nitrogen than in oxygen. Fœtal liver slices have a respiratory quotient of about 1·5, further evidence of rapid lipogenesis. Lactate production by fœtal liver is 90% greater in nitrogen than in oxygen; that of adult liver is only 30% greater. Fœtal liver metabolizes anaerobically much more pyruvate carbonyl carbon to carbon dioxide than adult liver does. Direct evidence from the rate of conversion of labelled glucose to labelled pyruvate showed that the glycolytic enzymes of fœtal liver respond to anaerobiosis more effectively than those of adult liver. Thus the aging of fœtal to adult tissue includes a loss of (*a*) the high rate of glycogen deposition, (*b*) the high rate of activity of one or more glycolytic enzymes which are rate-limiting in the adult, and (*c*) the high rate of lipogenesis which is evident anaerobically as well as aerobically.

Effect of Ethanol Intoxication on Lipid Fractions.

N. R. DI LUZIO (*Amer. J. Physiol.*, September, 1958) reports on the effect of acute ethanol intoxication on liver and plasma lipid fractions of the rat. Plasma and liver lipid fractions of rats were studied eight and 16 hours after administration of a single oral intoxicating dose of ethanol. When compared with rats which received an isocaloric amount of glucose, no differences were noted in plasma phosphate, cholesterol or triglyceride concentrations. Liver weight and triglyceride concentrations were significantly elevated eight and 16 hours after ethanol administration. The increase in liver neutral fat was not prevented by the simultaneous administration of choline and was not associated with alterations in liver or plasma phospholipid metabolism. The possible mechanisms of the development of a fatty liver after acute ethanol intoxication are discussed with particular reference to the possible hepatotoxic action of ethanol.

Experimental Epilepsy in Rabbits.

G. NELLHAUS (*Amer. J. Physiol.*, June, 1958) reports that a group of large, white-furred, blue-eyed rabbits, known as Beverens, was found to be susceptible to audiogenic seizures. Both Beverens and hybrids derived from them have a significantly higher degree of susceptibility to audiogenic seizures than rabbits of other breeds. No significant difference in susceptibility was observed between Beverens and hybrids or between males and females. The peak of seizure susceptibility occurred during the second month of life. A marked increase in the incidence and frequency of seizures was observed in the second and third generation of inbred rabbits. Certain variables influencing seizure-susceptibility are discussed, and the experimental advantages afforded by rabbits susceptible to sensory-induced seizures are pointed out.

Emotional Effects of Hypothalamic Stimulation.

H. NAKAO (*Amer. J. Physiol.*, August, 1958) reports a study of emotional behaviour produced by hypothalamic stimulation in cats. In unanæsthetized, unrestrained cats, the hypothalamus was stimulated with implanted electrodes. Responses depended on electrode position, and were classified as flight or aggressive reactions. Aggressive responses were, in general, elicited from middle hypothalamic stimulus sites, whereas flight reactions were more commonly elicited from rostral hypothalamic or preoptic sites. Both flight and attack were well directed and purposeful. In some animals conditioned responses to a buzzer were established with hypothalamic stimulation as the US. Hypothalamic stimulation was also successfully used to establish a conditioned avoidance response (food avoidance, compartment preference test). Stimulation at electrode sites producing flight reactions elicited a response (paddle-pushing) previously established to avoid a painful shock to the feet. The data suggest that hypothalamic stimulation arouses an affective experience closely akin to that produced by natural stimuli. The author considers that the possibility exists of cortical participation in hypothalamic-induced affective behaviour.

Effects of Hypothermia on the Heart.

L. I. GOLDBERG (*Amer. J. Physiol.*, July, 1958) states that the effects of hypothermia on ventricular contractility were studied in intact dogs, directly by attachment of a strain gauge arch to the myocardium, and indirectly by observation of left and right atrial, pulmonary and femoral arterial pressures. Marked increments in heart contractile force and reduction in the rates of contraction and relaxation occurred in all experiments during cooling. Myocardial depression occurred in several experiments, but only at temperatures near 20° C., and in the presence of extreme bradycardia. Total sympathetic block produced by epidural injections of 0·45% procaine solution and large doses of hexamethonium did not prevent development of the increments in heart contractile force, but did further decrease the rates of contraction and relaxation at low body temperatures. Epinephrine administration resulted in pronounced increments in heart contractile force and increases in rates of contraction and relaxation, often in the absence of chronotropic effects. No relationship was found between occurrence of ventricular arrhythmias and magnitude of heart contractile force. Spontaneous occurrence of fused contractions, with apparent summation and incomplete tetany, was observed in several experiments at low body temperatures.

Respiratory Inhibition Caused by Sudden Aortic Obstruction.

T. M. GILFOIL *et alii* (*Amer. J. Physiol.*, July, 1958) report that external constriction of the descending aorta elicits immediate inhibition of breathing in dogs under "Pentothal"-chloralose anæsthesia, both before and after sino-aortic denervation. Impulses initiated by traction of a ligature on the aorta are conducted into the thoracic part of the cord. There is no indication that this mechanism is activated in experiments involving internal occlusion in the innervated animals. Internal occlusion of the descending aorta elicits inhibition of breathing in dogs under morphine sulphate-chloralose

anæsthesia which have all neural pathways intact. The inhibition is related in large part to reflexes from the sino-aortic zones. In the majority of dogs studied the delayed inhibition of breathing after internal occlusion of the descending aorta was greatly reduced but usually not entirely eliminated by sino-aortic denervation. Therefore, some other respiration-inhibiting mechanism is also involved. That the respiratory centre may be relatively insensitive to changes in blood flow under the conditions of these experiments is indicated by the fact that in individual cases sudden severe changes in blood pressure in sino-aortic denervated animals were not accompanied by changes in respiration.

BIOCHEMISTRY.

Streptomycin.

A. YOSHIDA AND M. SEVAG (*Arch. Biochem.*, September, 1958) have shown that whereas normal cells of *Escherichia coli* can grow in a phosphate-deficient medium, cells grown for the first time in a streptomycin-containing medium cannot grow in the phosphate-deficient medium. The phosphate incorporation by phosphate-starved streptomycin-sensitive cells is strongly inhibited by a low concentration of streptomycin. In contrast to the phosphate-starved cells, phosphate incorporation by normal streptomycin-sensitive or streptomycin-resistant cells is not inhibited by streptomycin. In contrast to the cells grown in streptomycin-free medium, the cells grown in the streptomycin-containing medium cannot utilize their ribonucleic acid for growth during phosphate starvation.

Tranquillizing Agents.

E. W. HELFER *et alii* (*Arch. Biochem.*, August, 1958) have determined the effect of 13 tranquillizing agents or their pharmacologically inactive analogues on the succinoxidase system. The phenothiazine group of drugs inhibited the succinoxidase system most strongly and was followed closely in this property by reserpine, the derivatives of phenylcarbinol being the least active. "Quiactin" was relatively inactive. In all cases, cytochrome oxidase was more sensitive and succinic dehydrogenase less sensitive to inhibition than the complete succinoxidase system. Brain succinoxidase was less sensitive to inhibition than liver succinoxidase. The inhibition of succinoxidase seems not related to the mechanism of action of the tranquillizers.

Biotin.

J. F. WOESSNER *et alii* (*J. biol. Chem.*, August, 1958) have determined the activity of the two enzymes required for the carboxylation of β-hydroxyisovaleryl coenzyme A in biotin deficiency. The carbon dioxide activating enzyme is present at the same concentration in liver extracts prepared from normal or biotin-deficient rats, whereas β-hydroxyisovaleryl CoA carboxylase is completely lacking in biotin deficiency. The authors state that the vitamin is therefore apparently concerned not with the actual carbon dioxide fixation into adenyl carbonate but with the carboxyl transfer. The activity of the β-hydroxy-β-methylglutanyl CoA cleavage enzyme is not affected in biotin deficiency. These results are in accord with observations in other laboratories that the conversion of leucine metabolites to acetoacetate is blocked in biotin deficiency and that animals deficient in this vitamin are unable to synthesize cholesterol from β-methyl-crotonate.

Vitamin E.

J. S. DINNING AND P. L. DAY (*J. biol. Chem.*, July, 1958) have shown that vitamin E deficiency in monkeys leads to an increased incorporation of formate into the nucleic acids of skeletal muscle and bone marrow, but it does not influence the incorporation of formate into the nucleic acids of the other tissues tested. The increased incorporation of formate into nucleic acids from bone marrow by vitamin-deficient monkeys is confined mainly to desoxyribonucleic acid. Vitamin E deficiency does not affect the incorporation of formate into protein or the oxidation of formate to CO_2.

Calcium Metabolism.

I. CLARK AND R. GEOFFROY (*J. biol. Chem.*, July, 1958) report the results of a study of calcium metabolism. Subcutaneous administration of parathyroid extract, of magnesium sulphate, and of sodium citrate causes a rapid increase in the urinary excretion of radiocalcium, regardless of whether the isotope is given two days or 60 days earlier. On the basis of excretion data, the actions of these substances appear similar and indicate a direct osteolytic action on bone. Moreover, in the case of animals treated with the isotope 60 days earlier, the increased urinary content of radiocalcium as a result of treatment with parathyroid extract, magnesium sulphate or sodium citrate must be derived from a storehouse of older bone, and not from recently deposited calcium. The increased urinary excretion of radiocalcium after hydrocortisone treatment appears to be the result of decreased bone formation accompanied by normal resorption. All salts tested cause some hypercalciuria; however, only magnesium and citrate ions result in a marked increase in the urinary content of radiocalcium (an increase of six to ten times in the case of magnesium and of two to three times with citrate), indicating a specific action of these substances upon bone.

Cholesterol.

G. D. KLEIN (*Arch. Biochem.*, June, 1958) reports on the effect of dietary fat and linoleic acid levels on the content and composition of cholesterol esters in liver and plasma. Rats show an increase in plasma cholesterol levels as the linoleic acid content of the diet is increased. The cholesterol esters in liver are increased in fat deficiency, low in normal ranges of dietary fat intake, and increased again at high levels of linoleic acid intake. This second increase is specifically related to the polyunsaturated fatty acids content, not fat level. The polyunsaturated fatty acids content of liver cholesterol esters bears a simple relationship to the dietary content of polyunsaturated fatty acids; the level of ester found in the liver is not related to the content of polyunsaturated fatty acid in the ester. Plasma cholesterol esters differ markedly in composition from liver esters and do not follow the same relationship to the dietary fat content as the latter.

Œstrogen.

C. A. VILLEE AND D. D. HAGERMAN (*J. biol. Chem.*, July, 1958) have presented experimental evidence which indicates that the œstrogen-sensitive, diphosphopyridine nucleotide (DPN)-linked isocitric dehydrogenase described previously is a coupled enzyme system consisting of a true triphosphopyridine nucleotide (TPN)-linked isocitric dehydrogenase and what appears to be an œstrogen-sensitive transhydrogenase that catalyses the reaction: reduced TPN+DPN→TPN+reduced DPN. The œstrogen-sensitive transhydrogenase can be coupled with yeast TPN-isocitric dehydrongenase or with glucose-6-phosphate dehydrogenase. It was not possible to demonstrate a coupling of the transhydrogenase with DPN-linked enzymes, e.g., lactic or ethanol dehydrogenase.

Œstradiol.

D. J. MCCORQUODALE AND G. C. MUELLER (*J. biol. Chem.*, May, 1958) have shown that the soluble protein fraction from rat uterine homogenates contains seven amino acid-activating enzymes which catalyse amino acid-dependent exchanges between pyrophosphate and adenosine triphosphate. In response to a single administration of œstradiol, the activity of these enzymes increases rapidly over the ensuing 24-hour period. The individual enzymes respond independently.

Ammonia.

G. D. DUDA AND P. HANDLER (*J. biol. Chem.*, May, 1958) have studied the kinetics of ammonia metabolism *in vivo*. Ammonia, glutamine, L-leucine and D-leucine, labelled with N^{15}, were administered to rats, and the N^{15} of liver urea, glutamine, glutamate, aspartate, alanine and glycine, as well as total body glutamine and urea, was determined at various time intervals. Glutamine synthesis was found to be the major fate of ammonia. Urea synthesis, per unit time, was found to represent a fixed percentage of available ammonia over a large concentration range. The data indicate that D-leucine undergoes initial oxidative deamination, whereas the nitrogen of L-leucine is transferred to glutamate before it becomes available for glutamine or urea synthesis.

Absorption of Methionine.

F. A. JACOBS AND R. S. HILLMAN (*J. biol. Chem.*, May, 1958) have studied intestinal absorption of L-methionine, D-methionine and DL-methionine by an in-situ technique. These isomers are absorbed at similar rates as exhibited by their continuous absorption and net load exchange from the perfused intestinal segment. There is marked inhibition of intestinal absorption of both L-methionine and D-methionine in rats treated with deoxy-pyridoxine before perfusion. This inhibitory effect is brought on rapidly.

Brush Up Your Medicine.

HEARING AIDS.

In Australia it seems to be general practice to allow a deaf patient to go from one commercial firm to another trying out various hearing aids until he finds, or is persuaded he has found, one which suits him. I hope the following notes may do something to change this state of affairs.

When a patient complains of deafness or is found to be deaf during an examination, an accurate diagnosis of the cause should be made, and the examiner must be quite sure that nothing can be done to improve his hearing. At this stage it is well to remember that of late great advances have been made in otology, and many more conditions are now amenable to treatment. Assuming he has intractable deafness, the main problem is to provide the patient with a hearing aid which will allow him to hear and to understand speech properly.

The Characteristics of Speech.

Speech is man's main means of communication, and the patient is severely crippled if he cannot interpret it correctly. Normally, it has a frequency range of 200 to 6000 cycles per second and a relative intensity of 30 decibels. To understand speech at all a patient must interpret a minimum of 40% of words correctly.

The vowels give most of the sounds to the words, but it is the consonants which give the words meaning. Thus, in the phrase The cat sat on the mat, if the vowel sounds only are heard (-e -a- -a- o- -e -a-), the phrase is meaningless; but Th c-t s-t -n th m-t is not hard to interpret.

Unfortunately, as shown in Figure 1, the consonants are quieter than the vowels.

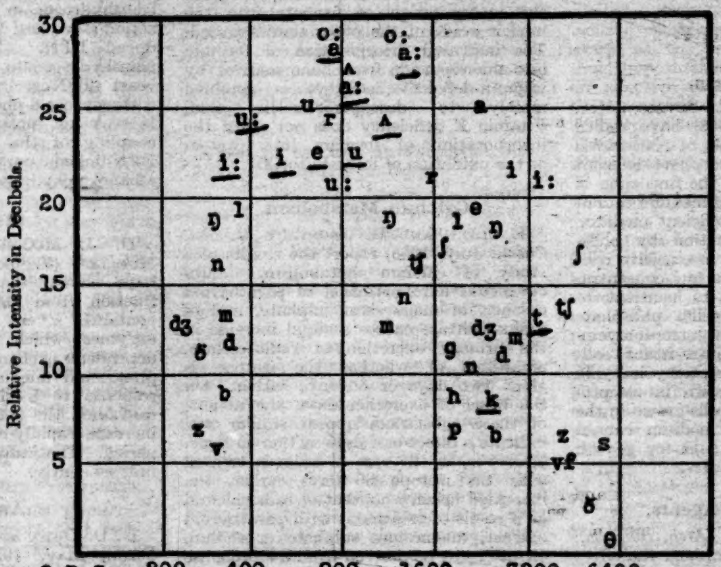

FIGURE I.

Frequency components of English sounds.[1] (From "Diseases of the Throat, Nose and Ear", edited by F. W. Watkyn-Thomas.)

The Need for a Hearing Aid.

This depends on the degree of deafness and the patient's occupation. Slight degrees of deafness may be unimportant to a labourer, but it is a very real problem to a student whose progress depends on his ability to hear a lecturer. There is no fixed rule, and each case must be judged on its own merits. It is probable that everyone whose hearing loss is so severe that he has difficulty in carrying on a general conversation needs a hearing aid if one can be fitted which actually benefits him. This is not always possible, though there are some dealers here who will not admit this to a potential buyer. On the other hand, a person with unilateral deafness does not need aid, though some dealers may try to persuade him he does.

War veterans whose deafness is attributable to war service and deaf children of school age who need hearing aids are provided with them by the Government. The Commonwealth Acoustic Laboratories provide this excellent service. War veterans are referred to them by otologists at the Repatriation Department. Children must be referred by an ear, nose and throat specialist to ensure that conditions amenable to treatment and children not really deaf can be screened out. If the child is only slightly deaf, insufficient to warrant a hearing aid, it is wise to give the parents a note to the headmaster, so that the child can be placed in a desk as near as possible to his teacher.

The Types of Hearing Aids.

Plastic ear trumpets are the most ancient type of hearing aid. They give a magnification of up to 20 decibels of clear undistorted speech. They are useful for older patients with mild deafness who cannot be bothered with new-fangled gadgets.

Modern electrical aids usually consist of a microphone amplifier and batteries in one box connected by a fine wire to a receiver with a plastic ear insert or rarely to a bone conductor held over the mastoid by a spring clip. The latter type of receiver is seldom preferred. Occasionally, elderly people with advanced otosclerosis find it more helpful. Again, people with bilateral chronic suppurative otitis media with copiously discharging ears who refuse operation to dry up the ears are better off with one because the plastic ear mould of the other type cannot be kept clean. There is a very good reason for keeping the receiver separate from the other components.

If the volume is turned on fairly high and the ear-piece is brought close to the microphone, the receiver starts to whistle, because of acoustic feed back. This makes it impossible to make an efficient aid all in one piece—in spite of some advertisements in the daily Press.

The size of receivers is generally about the same, but there are great differences in the size of the other box. By using transistors and miniature condensers, these boxes can be made quite tiny. The size of the microphone determines the ultimate limit, because if a microphone is too small it will not amplify all sounds uniformly. As the microphone amplifier unit is usually concealed in the patient's clothing, there is no great advantage in having a very small unit. It usually costs the patient an extra £40 to £50.

In a straightforward case of conductive deafness or perceptive deafness without recruitment, all that is needed is a simple amplifying unit with sufficient power to make up for the hearing loss over the speech range. There is a limit to the magnitude of amplification, as amplification over

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[1] A decibel is an artificial unit to measure hearing loss. A normal person will just hear sound along the zero line. A person unable to hear conversation will probably have an average loss greater than 30 decibels.

Figure I shows graphically the frequency in cycles per second (pitch) and the relative intensity (volume) of the components of spoken English. The relative intensity of the vowels and consonants of any word can thus be determined. For example, TH = 1 decibel, I = 22 decibels and N = 14 decibels in the word "thin". Thus the degree of hearing loss determines not only the number of words heard correctly, but also how much of each word is heard. A congenitally deaf child therefore may first reveal himself by a speech defect in which only the fragments of the words he actually hears are pronounced. If he is only slightly deaf, only the softest consonants will be missing from his speech.

130 decibels will give the patient a superadded noise deafness. This level is lower in perceptive deafness because in conductive deafness the disease itself protects the patient. In perceptive deafness with recruitment, however, the problem is more difficult.

Usually, when the labyrinth is damaged, recruitment is the rule. It is said to occur when a person has difficulty in hearing quiet sounds, but hears loud sounds equally well. With over-recruitment, he will hear loud sounds even louder than a normal person. He is the man who first asks you to speak up, and then almost immediately says: "Don't shout!" As soon as people speak loudly enough for him to hear the consonants, the vowels are so loud that they drown them and the meaning is thus lost.

There are three types of hearing aids which aim to improve the intelligibility of the consonants: (i) the tone control type, (ii) the peak cutting type, (iii) the automatic volume control type.

Tone Control Type.

On the grounds that the upper frequencies are more affected than the lower in perceptive deafness and that most consonants missed are of higher pitch than the vowels, some aids are made which amplify the higher frequencies more than the lower. This method has met with very little success. In my own experience of patients using this type of aid, they never get much more than 50% of the words correct in speech audiograms.

Peak Cutting Type.

This type of aid cuts the peaks from the sounds of louder amplitude as shown in Figure II (figures refer to relative intensity in decibels).

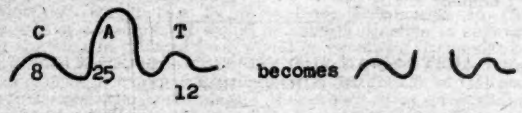

FIGURE II.

Peak cutting causes distortion of the words. It does, however, improve speech interpretation and is satisfactory when mild recruitment is present. However, with severe recruitment, the patient usually cannot manage to score much better than when he is using the type of aid discussed previously.

Automatic Volume Control Type.

This type of aid is by far the most satisfactory. It is hard to make, and there are only three British aids with automatic volume control (Littler, personal communication). Only two of these are on the market here. This aid does reduce the amplitude of the loud sounds without distortion, as shown in Figure III.

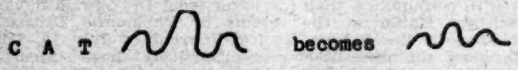

FIGURE III.

In my experience, most patients with recruitment manage a score of 70% of words spoken correctly with this type of aid. Unfortunately, some salesmen have misrepresented hearing aids with peak cutting as having automatic volume control. Fortunately, it is very easy to tell the difference. Turn the suspect aid on full and bring the receiver up to the microphone so that feed back occurs. If it has true automatic voume control, the receiver gives a variable warbling note. If it has not, the note is uniform in frequency.

Steps in Prescribing a Hearing Aid.

Many factors determine the aid most suitable. An accurate diagnosis of the type of deafness must be made. This includes an audiograph to measure the hearing loss and an examination to decide what degree of recruitment is present, if at all. The degree of hearing loss determines the strength of the aid needed. It is measured as follows. A patient wears a pair of ear-phones connected to an audiometer. The patient's threshold for sound is measured by turning up the attenuator (volume control) until the patient can just hear sound. The results are plotted graphically for each frequency for each ear. If a person has normal hearing, his graph runs along the zero line.

The audiograph shown in Figure IV is from a patient with perceptive deafness.

If a person has pure conductive deafness, a simple amplifier unit is all that is necessary, and the strength of the aid needed can be determined from the data shown on the audiograph.

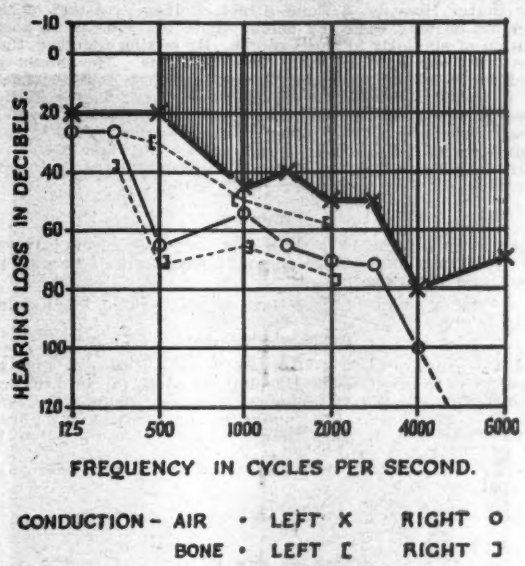

FIGURE IV.

A pure tone audiograph. The shaded area equals the hearing loss over the speech frequency range.

Perceptive deafness presents a more difficult problem. First, as there is a perfectly good conductive mechanism, the labyrinth, probably already damaged, has to withstand the full force of the sound produced by the aid. If this is high, noise deafness will be added to the patient's troubles. This limits magnification, and therefore the range of the sound the hearing aid produces. Secondly, the degree of recruitment must be measured by matching sounds at varying intensities so that the degree of automatic volume control needed can be measured.

With this data a prescription can be written for a hearing aid. It should show the gain required, the ear selected, and whether automatic volume control is necessary or not. Finally, when the patient has been fitted with the selected aid, a speech audiograph must be made so that we can be certain that the patient really has an aid which allows him to hear and understand speech properly. Usually the dealer sends up two aids and the better one is selected.

Speech Audiographs.

I consider a speech audiograph an absolute essential in testing a hearing aid. The patient wearing the hearing aid sits and listens to a list of words he hears from a gramophone record. As he hears each word he repeats it and the examiner sits beside him and takes the score of words heard correctly and incorrectly. I use in testing 35 P.B. (phonetically balanced) words for testing each instrument. Gramophone records must be used because the volume can be accurately adjusted in this case to a quiet conversational voice and lip-reading cannot occur.

The patient whose audiograph is shown in Figure IV had perceptive deafness with recruitment. When she was tested for speech as described, wearing an aid with simple amplification, she scored 11 of 35 words correctly, with an aid with peak cutting she scored 19 of 35 words correctly, but with an aid with automatic volume control she scored 26 of 35 words correctly. Had the patient been sent away with a hearing aid of type I or II, she would have been able to understand most of what was said to her, but she would have always been under a sense of strain and insecurity.

When a satisfactory aid has been selected, the patient should be taught to live with it, and how to take care of it and maintain it. The ear-piece must be properly fitted and as inconspicuous as possible. Most of those made here are too large. He should be helped to overcome the shame some patients feel about wearing an aid. In England, where some 400,000 have been issued by the National Health Service, the opposite effect has caused some people to wear them, ostentatiously, just as they do here with spectacles. He should be given the address of the Australian Association for Better Hearing, 3 Bond Street, Sydney, and told of the benefits he may enjoy by belonging to it. This is an association of similarly afflicted people. By mixing together, they can help one another with their problems. He should be told the value of lip-reading, and, especially if his deafness is progressive, should be advised to attend classes in lip-reading arranged by the Association. Many other matters need attention, but the foregoing covers most of the main points. A follow-up investigation should take place at least at six-monthly intervals. The problems that arise are innumerable, but usually are easy to solve.

Summary.

An attempt is made to show some of the problems involved in the treatment of deaf persons apart from treatment by medical and surgical means.

A brief account of a method of prescription for hearing aids is given.

Acknowledgements.

I am grateful to T. S. Littler, Werner Research Unit on Deafness, King's College Hospital, London, for information, and to F. W. Watkyn-Thomas and Mr. Dennis Fry and H. K. Lewis and Co. Ltd., publishers, for the use of Figure 1 from "Diseases of the Throat, Nose and Ear", edited by F. W. Watkyn-Thomas.

EDGAR H. ROSS, D.L.O. (Eng.).

Sydney.

Out of the Past.

In this column will be published from time to time extracts, taken from medical journals, newspapers, official and historical records, diaries and so on, dealing with events connected with the early medical history of Australia.

APPOINTMENT OF AN ANÆSTHETIST AT MELBOURNE HOSPITAL.[1]

[From the *Australasian Medical Gazette*, August, 1882.]

THE question of the advisability to appoint a chloroformist to the Melbourne Hospital was again brought under the notice of the Committee at the meeting held on July 18th. Dr. J. P. Ryan wrote stating that in the opinion of the honorary medical staff no necessity existed for the appointment of a chloroformist. In this opinion Dr. Robertson and Mr. James concurred, whilst Drs. Maloney and Williams and Messrs. Howitt, Fitzgerald, and Beaney advised the appointment of a chloroformist. The resident medical superintendent (Mr. H. L. Miller) was called in, and in reply to the Committee he stated that he did not think such an appointment necessary, inasmuch as there was always plenty of assistance in the hospital to administer chloroform. After a slight discussion the further consideration of the subject was postponed for one month.

Correspondence.

SHORT COURSES IN ANÆSTHETICS.

SIR: In reply to "Short Courses in Anæsthetics", January 31, 1959: Though I, too, look forward to the formulation by the medical profession of a scheme for medical services on a national scale, and consider it an urgent and immediate need, the simple adoption of the English system is obviously not the answer to our vastly different requirements.

Your previous correspondent feels that the field of anæsthesia should be reserved for specialists who are "readily available". This may be so in a very few thickly populated areas. In Western Australia, for instance, 120 practitioners serve the vast country areas, but there are only five rural centres capable of supporting a specialist anæsthetist, even under the most generous of medical schemes. Four hundred suburban general practitioners and specialists find specialist anæsthetists generally accessible, but to one-fifth of our practitioners, a specialist anæsthetist, surgeon or obstetrician may be anything up to 2000 miles away.

What of the group practitioners within 25 miles of Perth, or any like area? Should they refer every tooth extraction, Colles's fracture, laceration or appendix to the already overloaded central hospital—or call specialist anæsthetists and surgeons away from their major procedures? The judicious use of the local hospital by the reliable general practitioner anæsthetist involves the patient in no greater risk and much less cost and inconvenience. He does not require knowledge of hypotensive or hypothermia techniques, but he can acquire a sound knowledge of basic routines, their indications and problems, so that an adequate anæsthetic service is readily available when and where it is needed.

Our future general practitioners need the knowledge—at the very least—of "open ether" and simple local anæsthetics. For the practitioner with a special interest in anæsthesia, more association with teaching hospitals will be his means of keeping up to date with new methods and the risks involved, and to this end, more positions, not only in anæsthesia, should be made available to general practitioners at public hospitals.

Yours, etc.,

K. E. GILES.

1 Victoria Street,
Midland Junction,
Western Australia.

Undated.

AUSTRALIAN RHEUMATISM ASSOCIATION (VICTORIAN BRANCH).

SIR: Following on correspondence in the Journal recently (Dr. M. Kelly, December 27, 1958; Dr. Alpers, January 17, 1959; Dr. Drew, February 7, 1959), the following may be of interest.

1. In June, 1957, approval was granted by the B.M.A. Victorian Branch Council to form the Victorian Group (A.R.A.).

2. On September 17, 1957, the first meeting was held.

3. A State Council meeting was held on October 9, 1957.

4. A State Council meeting was held on August 21, 1958, following the annual meeting. Dr. Kelly's written apology for absence from this meeting was accepted. A copy of the minutes recording these facts was sent to him in the first week in December, 1958.

A comparison of these dates with those given by Dr. Kelly, taken in conjunction with the letter from Dr. Oswald Savage (Assistant Editor of the *Annals of Rheumatic Diseases*) published in the *British Medical Journal* of July 19, 1958, will show the difficulties encountered by those entrusted with office in organizations dealing with rheumatism.

A programme has been arranged for this year by the State Council.

Yours, etc.,

FRANK MAY,

Chairman, Australian Rheumatism Association (Victorian Branch).

81 Collins Street,
Melbourne.

February 17, 1959.

SIR: Dr. J. F. Drew (MED. J. AUST., February 7, 1959) surely must know that the large rheumatism clinics in Sydney have been evaluating both new and old anti-arthritic drugs and publishing their results in this Journal for about twenty years. Various supplemental agents of great value have also been emphasized. Gold and "Proseptasine" were amongst the earlier drugs dealt with, followed later by one of the sulphones, viz., "Promacetin", and more recently mepacrine and chloroquine. Doubtless "Osadrin", a chemotherapeutic agent of definite but limited value, will soon receive appraisal.

The Australian Rheumatism Association meetings in Sydney are well attended. The papers are sound and the

[1] From the original in the Mitchell Library, Sydney.

exchange of ideas stimulating. For the lack of interest in Victoria Dr. Michael Kelly must search for the cause amongst the members in that State. One must heartily endorse his remarks on the ineptitude of the Australian Rheumatism Council (MED. J. AUST., December 27, 1958), for one appraisement of doubtful practical value does not justify the existence of such council for nine years.

There appears to be little hope of adequate provision for the arthritic until these under-privileged people are organized into an association. What the tuberculosis group achieved by their own efforts would then become a similar objective for the arthritic.

Yours, etc.,

149 Wickham Terrace, Brisbane,
February 20, 1959.

J. A. SHANASY.

THE PRESCRIBING REGULATIONS OF THE NATIONAL HEALTH SERVICE.

SIR: The authority responsible for the prescribing regulations of the National Health Service has had a wonderful year. First of all he wrote that extraordinarily stupid circular about the "Channelling of Prescriptions", which showed an abysmal ignorance of the difficulties of prescribing in general practice. I am sure that few practitioners paid any attention to it. He then removed to the restricted section the drug chloroquine, which, despite the comments of my senior and better qualified colleague, has been found to be of great use in rheumatic arthritis, and which I do not think is as dangerous as has been suggested. We were then prevented from prescribing penicillin tablets for the prophylaxis of rheumatic fever, so that our work was trebled, as 24 and not 100 tablets could be prescribed at any one time. He has seen fit to halve the amount of "Chlotride" which can be prescribed, presumably in the interests of economy. It would be equally sensible to suggest that the consumption of beer would be cut down if the size of the bottles were halved. He has in fact nearly doubled the paper work. Perhaps some member of the College of General Practitioners who understands the problems of prescribing in general practice could be coopted to assist in the National Health Service, and so prevent this constant stream of irritating alterations.

Yours, etc.,

58 Ballarat Road, Maidstone, Victoria.
February 13, 1959.

J. F. POOLMAN.

Obituary.

FREDERICK LAWRENCE WALL.

We are indebted to Dr. G. A. Lendon for the following account of the career of the late Dr. Frederick Lawrence Wall.

Dr. Frederick Lawrence Wall passed away on September 25, 1958, leaving a widow, Dr. Winifred Wall, a son, Elliott, and three daughters, Mrs. Frank Riddell, Mrs. H. D. Johnston and Miss Ellen Wall, who is practising physiotherapy. Dr. F. L. Wall was born at Norwood in February, 1892, and after some years at Prince Alfred College went to the University of Adelaide for his medical course, qualifying M.B., B.S. in 1914. After three months' residence at the Adelaide Hospital he went overseas with the 3rd Field Ambulance, and saw active service with this unit on Gallipoli. Moving on to France in 1916, he served for 22 months with the 6th Battalion; after this, he was promoted to the rank of major and attached to the 7th Field Ambulance, and was serving with this unit at the Armistice. As a result of his work with the 6th Battalion he was awarded the Military Cross and *Croix de Guerre*, besides being mentioned in dispatches on several occasions.

Returning to Adelaide, he spent a further six months at the Adelaide Hospital, leaving at the end of 1919 to act as a long-term *locum tenens* for the late Dr. C. T. Cooper. On Dr. Cooper's return, he practised at Wallaroo for nearly a year, during which time he suffered a series of severe staphylococcal infections. This illness forced him to return to Adelaide again, and he entered into partnership with Dr. Cooper, building a home at the junction of Magill Road and Wellington Road. There he lived and practised for thirty years, before handing over to Dr. Goodhart, who was in his unit when he had command of the 110th Casualty Clearing Station at Milne Bay. The practice was a large one when he joined Dr. Cooper, and the rate at which it grew may be judged from the number of partners who joined the "firm"; in sequence they were Dr. D. J. R. Sumner, Dr. Ken Cooper, Dr. Dorothy Adams, Dr. R. Goodhart, and finally Dr. Wall's son-in-law, Dr. Frank Riddell.

For many years Dr. Wall had little time for anything but work. This was rather a pity, for he was an excellent tennis player, and represented the University of Adelaide in the triangular matches held in Adelaide during Easter, 1914,

displacing the writer of this memoir from the team to the position of emergency. Like most busy doctors, Dr. Wall soon found that it was necessary to exchange tennis for golf, and he became a member of the Royal Adelaide Golf Club. So keen did he become about this game that he bought a cottage adjoining the Mt. Lofty links, and on his times off he would often play there, accompanied by a favourite black and white cocker spaniel who was marvellous at finding balls. So wedded was he to the game, that he took a No. 2 iron to Milne Bay.

Dr. Cooper, senior, was one of Adelaide's leading obstetricians, for some years averaging almost a confinement a day. F. L. Wall set himself to follow in Dr. Cooper's footsteps, but wisely limited himself to a mere 200 cases *per annum*. He was extremely popular with both patients and fellow practitioners, and was one of that dying race, the general practitioner who was a recognized authority in obstetrics and did practically all his own surgery, with results which justified his confidence in his all-round training.

A strong B.M.A. supporter, he was President of the South Australian Branch in 1947 and Honorary Treasurer from 1951 to 1954. Also he was one of the most, if not the most, regular of attendants at the B.M.A.'s post-graduate lectures and ward rounds. In 1938 he took a year off to study obstetrics and gynæcology in England.

In World War II he was promoted to the rank of lieutenant-colonel and given command of the 110th Casualty Clearing Station. This unit was eventually posted to Milne Bay, where it arrived two days before the Japanese attack. As I mentioned before, in addition to his standard kit, F. L. Wall took a No. 2 iron to Milne Bay, spending some of his time swinging this club, so that he would not "lose the groove" which had taken so many years to acquire. But the club's main use was as a defence against serpents, despite the fact that a golf club is not an ideal snake-killing device, as many of us have discovered at Seaton. Returning from New Guinea by air, he gave a moving description of the unnecessary discomforts of this mode of transport, especially the extreme cold which had to be endured in tropical uniform, and the complete lack of any seating accommodation; this may have been all right for fit young men, but F. L. Wall was over 50 years of age at this time. On his return, he was made D.A.D.M.S. and then D.D.M.S., 4th Military District, for 1944-1945. It was characteristic of his ingrained habits of hard and prolonged work that, in addition to carrying out his responsible task, he helped his wife and Dr. Dorothy Adams, who were jointly carrying on the practice, by doing some of the night work, in addition to working all day at his military duties.

Most of his friends thought that his arduous tropical service when over 50 years of age, followed by the style of life described above, was too much, even for his boundless energy. When the war was over he resumed practice under the inevitably difficult conditions of the post-war world, and at the same time he took over a large share of the B.M.A. work, at a period when the Association's influence and activities were expanding more rapidly than ever before. Though mentally fresh and ever willing to take on more responsibility, he began to look tired, and I was struck by his changed look when he came in one day to be examined for an insurance policy. Whilst lying down to be examined he actually underwent his first occlusion in my consulting room. This was in 1951, and although he made a good recovery he could not continue his practice, but was able to consult on North Terrace and live in his father's old home at Barton Terrace. But he had a further and more serious infarction in 1956; again he recovered well, but this reduced him to less than half a day's work. The final attack was followed by a hemiplegia from which he showed no sign of recovery.

This bald factual recital gives no clue to what sort of a man he was. I think I can plainly say that I never knew anyone so transparently honest in his dealings with his patients and fellow practitioners, and few have done their work so conscientiously; he would receive a difficult and polysymptomatic patient at the end of 16 hours' work just as courteously as he would have done early in the day, and examine him or her just as thoroughly. The great esteem in which he was held is amply proved by the large number of letters which arrived from his old patients, although he had been away from his practice for several years. His advice about practice and partnership was eagerly sought by the younger men, especially in that period when they were settling down after the second World War, and he would take infinite pains to make sure that this advice was in the best interest of the parties concerned. His death is a great loss to his family and friends, and the South Australian medical world will find it hard, if not impossible, to replace him.

SAMUEL STOOPS GARDINER.

WE are indebted to Dr. Arthur D'Ombrain for the following tribute to the late Dr. Samuel Stoops Gardiner, who died on December 19, 1958.

As a former colleague of the late Dr. S. S. ("Sammy") Gardiner, may I add my tribute to those of the many who knew, admired and loved him? Not only was he a surgeon of world renown and an authority on actinomycosis; he was also a great teacher of surgery, and a guide, philosopher and friend to all who had the fortune to come under his tuition. He was one of those men who became a legendary character during his own lifetime, and the tales about him are legion, many true and many somewhat elaborated.

One I can vouch for myself, and I think it worth quoting as illustrating his human approach to a patient. In a male ward of the Mater Hospital, Newcastle, I was doing my rounds on one side of the ward, while "Sammy" was visiting his patients on the other side. He had instructed a man to eat the contents of a medicament put up in a tin packing. I heard him say to the patient: "You haven't eaten it all, mate." The patient said, in a doleful tone: "Have I got to eat it all, doctor?" Dr. Gardiner replied: "Yes, the whole lot, and the blinking tin too!"

He was most generous in allotting operations to his residents, standing by all the time, and guiding them.

On one occasion, I had the honour of treating his son for an eye accident. Solemnly surveying the result of my humble efforts, he turned to me and said: "Do you know, I honestly don't think I could have done any worse myself."

He was a man among men, devoid of artifice, and none of us that knew him will ever forget him, nor will the multitude of patients whose lives he saved.

Royal Australasian College of Surgeons.

SIMS COMMONWEALTH TRAVELLING PROFESSOR, 1959.

THE Royal Australasian College of Surgeons announces the following programme in New South Wales for Professor W. Gissane, of Birmingham, the Sims Commonwealth Travelling Professor for 1959: Saturday and Sunday, March 14 and 15, attend week-end meeting at Canberra arranged by the N.S.W. State Committee of the Royal Australasian College of Surgeons; Monday, March 16, visit Royal Newcastle Hospital; Tuesday, March 17, lecture, "Wound Shock and the Problems of Diagnosis in Severe Injury", Stawell Hall, The Royal Australasian College of Physicians, 145 Macquarie Street, Sydney, at 8 p.m.; Wednesday, March 18, visit Sydney Hospital; Thursday, March 19, morning, visit Royal Alexandra Hospital for Children; afternoon, visit Repatriation General Hospital, Concord; Friday, March 20, public lecture to police, St. John Ambulance Brigade, Red Cross Voluntary Aids, etc., "Modern Trends in First Aid", Wallace Theatre, University of Sydney, 3.30 p.m.; Monday, March 23, visit Royal North Shore Hospital of Sydney; Tuesday, March 24, visit Royal Prince Alfred Hospital; Wednesday, March 25, visit St. Vincent's Hospital; evening, lecture, "Treatment and Prognosis in Burns with Some Observations on the Prevention of Home Accidents", Stawell Hall, 8 p.m.; Thursday, March 26, visit St. George Hospital; Thursday, May 14, lecture, "Modern Trends in First Aid", Royal Australasian College of Surgeons, in conjunction with the Post-Graduate Committee in Medicine in the University of Sydney, Stawell Hall, 8 p.m.

Post-Graduate Work.

ROYAL PRINCE ALFRED HOSPITAL: EAR, NOSE AND THROAT DEPARTMENT.

Seminar Programme, 1959.

THE staff of the Ear, Nose and Throat Department will conduct a seminar on the second Saturday of every month at 8 a.m. in the Scot Skirving Lecture Theatre, Royal Prince Alfred Hospital. The main speaker will not exceed forty minutes, and there will be a discussion at the conclusion of his remarks. All medical practitioners and clinical students are invited to attend.

At the next seminar, to be held on March 14, 1959, Dr. G. C. Halliday will speak on "Non-Suppurative Deafness".

Notes and News.

Health Education Summer School.

The summer school organized by the Central Council for Health Education, London, will be held from August 18 to 28, 1959, at Neuadd Reichel, University College of North Wales, Bangor. The study theme will be "The Dynamic Approach to Health Education". The object of the school is to increase knowledge and improve skills in the methods and techniques of modern health teaching. The inclusive

fee for the course will be £22. Applications to participate in the school should be made to the Medical Director, Central Council for Health Education, Tavistock House North, Tavistock Square, London, W.C.1.

A New Factory for Sterling Pharmaceuticals Pty. Ltd.

A new laboratory is now being built at Ermington, N.S.W., to be the Australian home of the Sterling Drug Inc. organization, which operates in this country through its Australian subsidiary, Sterling Pharmaceuticals Pty. Ltd. The associated companies in the Australian group are the Nyal Company, Winthrop Laboratories, Bayer Pharma Pty. Ltd., Cook-Waite Laboratories and Scott and Turner Ltd.

The laboratories, designed by architects Stephenson and Turner, are being built on an eleven-acre block of riverside land. The project comprises a two-storey administration and amenities block with a cafeteria, theatrette and internal garden courts. Manufacturing, finishing and warehouse facilities will be housed in a separate one-level structure, with the company's printing, engineering and maintenance departments in the lower ground floor. A total area of 168,000 square feet of space is planned, much of which is air-conditioned.

Naval, Military and Air Force.

APPOINTMENTS.

THE following appointments, changes etc. are published in the *Commonwealth of Australia Gazette*, No. 9, of February 5, 1959.

NAVAL FORCES OF THE COMMONWEALTH.

Permanent Naval Forces of the Commonwealth (Sea-Going Forces).

Honorary Surgeon.—Surgeon Commander John Arthur Basil Cotsell is appointed Honorary Surgeon to His Excellency the Governor-General for a period of three years, dated 13th November, 1958. The appointment of Surgeon Captain Kenneth Charles Armstrong as Honorary Surgeon to His Excellency the Governor-General is terminated, dated 12th November, 1958.

Public Health.

MENTAL HEALTH ACT, 1958, OF NEW SOUTH WALES.

THE Under Secretary, Department of Public Health of New South Wales, has requested publication of the following letter on the operation of the *Mental Health Act*, 1958, of New South Wales. The letter, which is addressed to all medical practitioners, is as follows:

Department of Public Health,
52 Bridge Street,
Sydney,
23rd February, 1959.

Dear Sir,

I desire to invite your attention to the fact that the Mental Health Act, 1958, will come into operation on 2nd March, 1959. This Act repeals the Lunacy Act of 1898 and amendments thereto.

One of the chief concerns of the medical practitioner will be the amplified certificate, known as Schedule 2, which has been deemed necessary in the case of admission of mentally ill persons to what will be known as an Admission Centre.

Apart from direct admission of voluntary cases to Mental Hospitals the only avenue of admission after the commencing date will be through an Admission Centre. This will mean that a previous mode of procedure, viz., direct admission by request of relatives, supplemented by two medical certificates, will be abandoned.

The certificate referred to in paragraph two is in substitution for the current Schedule 2A Certificate,

DISEASES NOTIFIED IN EACH STATE AND TERRITORY OF AUSTRALIA FOR THE WEEK ENDED JANUARY 31, 1959.[1]

Disease.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Northern Territory.	Australian Capital Territory.	Australia.
Acute Rheumatism	..	..	4(2)	..	..	..	..	..	4
Amœbiasis	..	..	..	..	..	..	1	..	1
Ancylostomiasis	..	..	..	..	..	..	3	..	3
Anthrax	..	..	..	..	..	..	..	..	..
Bilharziasis	..	..	..	..	..	..	..	..	..
Brucellosis	..	..	..	..	..	..	..	..	..
Cholera	..	..	..	..	..	..	..	..	..
Chorea (St. Vitus)	..	1(1)	..	..	..	..	..	..	1
Dengue	..	..	..	..	..	..	..	..	..
Diarrhœa (Infantile)	3(1)	22(19)	7(7)	..	..	1(1)	2	..	35
Diphtheria	..	..	..	1	..	..	..	..	1
Dysentery (Bacillary)	..	..	3(3)	..	4(2)	..	2	..	9
Encephalitis	..	1(1)	..	..	..	..	..	..	1
Filariasis	..	..	..	..	..	..	..	..	..
Homologous Serum Jaundice	..	..	..	..	..	..	..	..	..
Hydatid	..	..	..	..	..	..	..	..	..
Infective Hepatitis	40(15)	47(13)	14(3)	16(8)	3(1)	..	..	..	120
Lead Poisoning	..	..	..	..	..	..	..	..	..
Leprosy	..	..	..	..	..	..	..	..	..
Leptospirosis	..	..	..	..	..	..	..	..	..
Malaria	..	..	1	..	..	..	..	..	1
Meningococcal Infection	..	1	1	..	..	3	..	..	5
Ophthalmia	..	..	..	..	..	..	..	..	..
Ornithosis	..	..	..	..	..	..	..	..	..
Paratyphoid	..	..	..	..	..	..	..	..	..
Plague	..	..	..	..	..	..	..	..	..
Poliomyelitis	..	1(1)	1	..	..	..	..	..	2
Puerperal Fever	..	..	..	..	..	..	..	..	..
Rubella	..	35(24)	2(2)	2	9(8)	1	..	..	49
Salmonella Infection	..	..	..	..	4(4)	..	..	..	4
Scarlet Fever	8(3)	9(6)	..	..	1	1	..	..	19
Smallpox	..	..	..	..	..	..	..	..	..
Tetanus	..	1	1(1)	..	..	..	..	..	2
Trachoma	..	..	..	..	30	..	2	..	32
Trichinosis	..	..	..	..	..	..	..	..	..
Tuberculosis	20(14)	7(2)	18(8)	2(2)	4(3)	3	2	..	56
Typhoid Fever	..	1(1)	1(1)	..	2	..	..	..	4
Typhus (Flea-, Mite- and Tick-borne)	..	..	..	..	..	..	..	..	..
Typhus (Louse-borne)	..	..	..	..	..	..	..	..	..
Yellow Fever	..	..	..	..	..	..	..	..	..

[1] Figures in parentheses are those for the metropolitan area.

which provided no information or data for the assistance of the admitting medical officer in determining care and treatment applicable.

Enclosed for your information is the form of medical certificate which will be required. It will be known as Schedule 2 Certificate under the Mental Health Act, 1958. This Certificate is self-explanatory and the co-operation of all members of the medical profession in completing the form in toto, as far as practicable, would be appreciated, as the additional particulars sought in regard to a mentally ill person would be invaluable to the medical officers of the Admission Centre.

For the time being Admission Centres have been established at Darlinghurst, Newcastle, Kenmore (Goulburn) and Bloomfield (Orange).

It will be noted that Part II of the Certificate provides that a medical practitioner may authorise the escort of a mentally ill person to an Admission Centre by a member of the Police Force. It is emphasised that this authority should only be signed where it is deemed advisable in the interests of the patient and the community generally.

As is customary, supplies of Schedule 2 Certificates may be obtained from the nearest Court House, Office of the Director of State Psychiatric Services, 52 Bridge Street, Sydney, or at the Government Printing Office.

As some embarrassment may be caused by the production of an outmoded certificate, it is suggested that all stocks of the existing Schedule 2A Certificate should be destroyed.

Yours faithfully,

G. R. G. CAMERON,
Under Secretary.

Australian Medical Board Proceedings.

NEW SOUTH WALES.

THE following additions and amendments have been made to the Register of Medical Practitioners for New South Wales in accordance with the provisions of the *Medical Practitioners Act*, 1938 to 1958:

Registered medical practitioners who have complied with the requirements of Section 17 (3) and are registered under Section 17 (1a) of the Act: Barker, Denis, M.B., B.S., 1956 (Univ. Adelaide); Cummins, Brenda Mary, M.B., B.S., 1956 (Univ. Melbourne); Horgan, Terence Joseph, M.B., B.S., 1957 (Univ. Melbourne); Pattison, Grant, M.B., B.S., 1951 (Univ. Melbourne); Plint, Colin Watson, M.B., B.S., 1948 (Univ. Queensland); Scanlan, Gerald John, M.B., B.S., 1954 (Univ. Queensland); Nicholl, Neil Livingstone, M.B., B.S., 1958 (Univ. Queensland).

Registered medical practitioners who have complied with the requirements of Section 17 (3) and are registered under Section 17 (1b) of the Act: Battersby, Henri Glenister Shalcross, M.B., Ch.B., 1957 (Univ. Edinburgh); Harrington, James Daniel, L.A.H. (Dublin), 1957, M.B., B.Ch., 1958 (N.U. Ireland), L.M. (Rotunda), 1958; Ralph, John Benignus, L., L.M., R.C.P. (Ireland), L., L.M., R.C.S. (Ireland), 1942; Russell, Arthur Frederick, M.B., B.S., 1939 (Univ. London), M.R.C.S. (England), L.R.C.P. (London), 1939, M.D., 1946 (Univ. London), D.T.M. and H. (R.C.P. and S.), 1946; Steward, Paul, M.R.C.S. (England), L.R.C.P. (London), 1951, D.A. (R.C.P. and S.), 1956; Taylor, George Henry Carr, M.B., Ch.B., 1940 (Univ. Aberdeen).

Registered medical practitioners who have complied with the requirements of Section 17 (3) and are registered under Section 17 (2A) of the Act: Nesbit, Blanka, M.D., 1947 (Univ. Grasz); Scheffer, Elizabeth, M.D., 1924 (Univ. Pecs).

Registered medical practitioners who have been issued with licences under Section 21C of the Act: Babajews, Alibaba, M.D., 1937 (Univ. Baku), in respect of the St. Joseph's Hospital, Auburn; Fekete, Istvan, M.D., 1926 (Univ. Pecs), in respect of the Dubbo Base Hospital, Dubbo; Hidi, Madelaine, M.D., 1953 (Univ. Budapest), in respect of the Liverpool District Hospital, Liverpool; Kaufman, Mieczysław, M.D., 1944 (Univ. Breslau), in respect of the Lithgow District Hospital, Lithgow; Lezynska, Alicja, M.B., 1951 (Univ. Warsaw), in respect of the Lithgow District Hospital, Lithgow; Nedeljkovic, Miroslav, M.D., 1934 (Univ. Belgrade), in respect of the Liverpool District Hospital, Liverpool; Temesvary, Andrew, M.D., 1952 (Univ. Zurich), in respect of the Liverpool District Hospital, Liverpool; Zoltan, Martha, M.D., 1954 (Univ. Budapest), in respect of the Western Suburbs Hospital, Croydon.

Deaths.

THE following deaths have been announced:

LITTLE.—Henry Franklin Little, on February 16, 1959, at Melbourne, Victoria.

BELL.—Harry Charles Rikard Bell, on February 20, 1959, at Sydney.

HILL.—Keith Joseph Hill, on February 21, 1959, at Ipswich, Queensland.

Diary for the Month.

MARCH 7.—Tasmanian Branch, B.M.A.: Annual Meeting.
MARCH 10.—New South Wales Branch, B.M.A.: Executive and Finance Committee; Medical Politics Committee.
MARCH 12.—New South Wales Branch, B.M.A.: Clinical Meeting.
MARCH 13.—Queensland Branch, B.M.A.: Council Meeting.
MARCH 13.—Tasmanian Branch, B.M.A.: Branch Council.
MARCH 14.—Western Australian Branch, B.M.A.: Annual General Meeting.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Medical Secretary, 135 Macquarie Street, Sydney): All contract practice appointments in New South Wales. Anti-Tuberculosis Association of New South Wales.

South Australian Branch (Honorary Secretary, 80 Brougham Place, North Adelaide): All contract practice appointments in South Australia.

Editorial Notices.

ALL articles submitted for publication in this Journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations, other than those normally used by the Journal, and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given: surname of author, initials of author, year, full title of article, name of journal, volume, number of first page of the article. The abbreviations used for the titles of journals are those of the list known as "World Medical Periodicals" (published by the World Medical Association). If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors submitting illustrations are asked, if possible, to provide the originals (not photographic copies) of line drawings, graphs and diagrams, and prints from the original negatives of photomicrographs. Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary is stated.

All communications should be addressed to the Editor, THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, New South Wales. (Telephones: MW 2651-2-3.)

Members and subscribers are requested to notify the Manager, THE MEDICAL JOURNAL OF AUSTRALIA, Seamer Street, Glebe, New South Wales, without delay, of any irregularity in the delivery of this Journal. The management cannot accept any responsibility or recognise any claim arising out of non-receipt of journals unless such notification is received within one month.

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